THE MARINE REVIEW

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Industrial Future Up to Congress

Course of Nations Commercial History Will be Shaped in Next Few Months by Legislation for Air, Land and Water Carriers

CONGRESS adjourned on March 4 under a stigma of unaccomplishment which led to rather general expressions of relief at its disappearance and lack of enthusiasm over its revival. But the new congress, coming into session on May 19, is being watched by the country at large with an interest which reflects the knowledge that in congressional hands now rests the solution of problems of vital concern to every American industry.

Transportation difficulties weigh upon the entire country. The ability shown by the administration and by congress in bringing these problems to solution will go far to shape the future commercial history of the United States. The difficulties of the railroads, with millions of deficits piling up daily, is generally appreciated although the answer remains hidden. Reports of intentions to scrap airplane material and to abandon aviation fields, has stirred many to protest against this forfeiture of the opportunity to develop an aerial freight, mail and passenger transportation system. The evolution and the enactment of a merchant marine policy also calls for the appearance and use of maximum portions of congressional foresight. Transportation problems of the land, air and sea must thus be solved jointly.

Hopeful Signs for the Future

While in present importance, railroad legislation takes first rank, a wise solution of our merchant marine question may easily have even greater influence in laying down the lines along which American commercial history in the future will be written. For that reason, it is distinctly encouraging to see officials of the administration propounding and supporting definite marine policies, with individuals and associations actively backing amending proposals. With the railroad question on the other hand, the administration has confessed its lack of decision on any one policy and solutions proposed by individuals have not won widespread attention. The policies favored by Chairman Hurley, of the shipping board, are being criticized more freely—a hopeful sign. His outline of a proposal for handling the American merchant marine is still broadly approved, as indicated in the nation-wide balloting presented in THE MARINE REVIEW last month, but suggested amendments are multiplying. These include definite assurances that all ships will be sold, removing the possibility of federal competition, freedom from government regulations as to routes or rates, sale of smaller vessels to foreigners, removal of the government from the marine insurance field, etc. The suggestions that congress will not support the proposal to write down the value of our war-built ships are countered by reference to the freedom with which the war department is handling a similar problem with war materials not needed now. Freedom from restrictive legislation, particularly covering the inequalities in measurement and size of crews, is being actively sought. In a legislative way, our merchant marine future is in a state of flux which should finally settle at a level best calculated to insure the success of American marine competition.

A Return to Private Initiative

Shipbuilders have united in requesting the President to remove restrictions on building for foreign account, Mr. Hurley now supporting this request. Mr. Piez differs radically from Mr. Hurley on the policy of canceling ship contracts, the former desiring most of the contracts to be carried out, the latter favoring rather widespread cancellation, and a revival of competitive bidding. Homer L. Ferguson, shipbuilder, welcomes the return of competition with its opportunities for private initiative. James A. Farrell, steelmaker and export authority, predicts that American ships, given equal opportunities with foreigners with regard to navigation and measurement laws, will not find the wage question much of a handicap.

Efforts of congress for years past in solving transportation problems have not revealed remarkable foresight. Intelligent and active public opinion now has the opportunity of forcing wisdom into our new transportation laws.

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World Charter Market Reviewed by

RELEASE SHIPS

Definite Plans Are Made to Return Commandeered Ships Now Engaged in Relief Work to Normal Trade

JOHN H. ROSSETER, director of operations of the shipping board, has promised that a substantial number of American ships will be returned to normal trades within a month. This promise was evidently predicated upon the intention of Herbert Hoover to discontinue the fleet that has been carrying relief cargoes. The commission on Belgian relief came to an end on May 1, but it is understood that it will be June and perhaps August before the owners of these ships get them back. During the month past, two ships were returned to their owners.

Some 500 ships have been engaged in the relief work. The Belgian government appointed Prentiss M. Gray to care for its buying and shipping in the United States. That government will place at his disposal 87,000 tons of requisitioned vessels, and the shipping board has agreed to allocate 250,000 tons more to his control. A new shipping company grows out of the arrangement, known as P. M. Gray & Co., Inc., New York. This company expects ultimately to do a general import and export business. Some prominent Americans are associated in the enterprise.

W. A. Harriman has been reputed to have purchased heavily of the stock of the American-Hawaiian line, although rumors have been afloat that a large shipping combination was on foot in which were involved not only this line but the International Mercantile Marine and the Atlantic, Gulf & West Indies Steamship Co. Large shipping combines are not desired by the shipping board, it is understood, and should any such movement be initiated it would certainly meet with opposition on the part of the government.

Dollar Interests To Expand

On the other hand Robert Dollar, of Pacific coast fame, is said to be planning to move his headquarters to New York, and to establish a line from New York to Vancouver. En route, these vessels will call at Panama and ports in the West Indies. According to the prospectus it is not intended to withdraw any of the ships of the Dollar Steamship Co. from their present runs but the new services will be established with steamers yet to be acquired. Mr. Dollar intends to build new steel steamers of 10,000-ton capacity for this line.

An important move in American shipping circles has also been initiated by the Atlantic, Gulf & West Indies Steamship Co. by the purchase of an interest in the Compania Petrolera de Tepetate, S. A., which owns a large oil acreage in Mexico. It is understood that the purchase was made first with the intention of developing an industry to provide freight for transportation, and second to provide a fuel source for the ships of the several lines owned by the company.

Coincident with these steps in advance taken by the American companies, the government has announced its intention to restore the Bush piers at Brooklyn and thereby provide increased docking space. The Russian-American line piers have been returned. Eight other piers will probably be returned within a month. The companies that will be affected by the restoration of the piers are Funch, Edye & Co., Norton, Lilly & Co.; the Prince lines; the Lloyd-Braziliero, and the American-Hawaiian line.

The Eastern Steamship Lines, Inc., decided to resume its summer services prior to the announcement of the railroad administration to permit summer excursion travel. The opening of spring brings a slight improvement in shipping at the port of New York, although it may be a long time before normal is reached again. The large transatlantic lines are of the opinion that European tours will not be open before 1920. Their capacities are taken up exclusively with the return of soldiers. The port of Boulogne-sur-mer, France, however, will be opened to tourist travel by the Holland-American line.

The first American vessel to reach a German port since the war and return docked last month. The WESTWARD HO arrived at Dantzig on Jan. 19 and returned on April 8. The WEST HUMHAW arrived at Dantzig, March 4, and returned on April 9.

To Use German Vessels

The opening up of Germany will bring a slight relief to the shipping situation because use will be made of the German merchantmen. The allied powers have determined to turn the German ships over to the various allied powers in proportion to the abilities of each to manage the vessels. As a result of this agreement, the Hamburg-American liner KAISERIN AUGUSTE VICTORIA was brought to New York where she is undergoing repairs to be turned into a transport. The ZEPPELIN, a 15,200-ton vessel built in Germany during the war for the German-Australian passenger trade, also docked at New York during the month, bringing back American soldiers. Another German vessel, the CORDOBA, seized in Peru, has been turned over to the United States. Vessels belonging to the shipping board will be continued to be used in the food relief of Europe, but Chairman Hurley is exerting efforts to utilize the tonnage better than during the past by striving to pro-

To Retain Ships

ACCORDING to a cablegram from Paris, it has been decided that German vessels seized by the United States and Brazil will remain United States and Brazilian property. Some of the larger vessels seized are as follows, the figures denoting deadweight tonnage: AGAMEMNON, 8700; AMERICA, 20,765; ANTIGONE, 11,000; ARTEMIS, 11,500; AEOLUS, 12,350; BRIDGEPORT, 10,000; COVINGTON, 11,717; GEORGE WASHINGTON, 13,000; LEVIATHAN, 15,000; NANSEMOND, 14,700; PHILIPPINES, 13,000, and the POCAHONTAS, 10,550. Many of these vessels are capable of making fast time: LEVIATHAN logs 24 knots an hour, AGAMEMNON 23½, GEORGE WASHINGTON 19 and COVINGTON 15½.

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Experts in This Country and Abroad

SEEK CARGOES

Committee of Experts Make Survey of European Trade Situation to Provide Return Cargoes for Relief Ships

vide return cargoes. The board sent a committee of experts abroad recently to make a survey of the situation in Europe. The committee is composed of W. M. Brittain, secretary of the American Steamship association; Joseph Scott, assistant manager of the States Marine & Commercial Co.; A. W. Burchand, vice president of the General Electric Co., and J. R. Gordon of the Union Sulphur Co.

The shipping board has over 150 vessels engaged in European food relief, of more than 950,000 deadweight tons. There was an increase of over 150,000 deadweight tons assigned to this service during April. What may have been the unit of measure used to make these allocations has not been made clear although private American operators are not entirely satisfied with the situation. While politics may not as yet have entered into this plan of operation, a good example of what might be expected was exhibited last month in Washington when a delegation representing Wilmington, N. C.; Charleston, S. C.; Brunswick and Savannah, Ga., and Jacksonville, Fla., appealed to the shipping board for the use of 14 government ships to be operated out of these southern ports in the Latin-American trade. United States Senators Simmons, of North Carolina, and Trammell, of Florida, headed the delegation of appeal.

Tonnage Demands Are Heavy

When the United States undertook to provision Europe, Russia was not figured into the compilation. Now it is proposed to feed Russia as well. This would undoubtedly make a tremendous drain upon the American shipping facilities, and would demoralize the American tonnage market for many months. French and English shipping interests are busy with their own affairs, and could not help in the movement of the food cargoes to Russia. The enormous demand on American ships has been readily discernible in the few charters that have been taken recently. These have been few because not many ships are being offered. On the other side of the Atlantic, however, the situation is different. Charters for foreign vessels, both for time and voyage, can now be made in Europe without the consent of the ministry of shipping or the interallied chartering executive. A number of vessels ranging from 3500 to 7000 tons are said to have been fixed for six months on the basis of 20 shillings, general trading. There has been some business put through on American account at 25 shillings for 12 months' transatlantic trading. Mutual vessels are in good demand at fairly good rates for certain bottoms.

In comparison with the activities in the American shipping field has been noted, in strong contrast, what the foreign lines are planning. The French-Canada Steamship Corp. has decided to establish an office in Philadelphia and it is presumed that the line will serve that port with frequent sailings to Italy, France, South America and South Africa. The Pacific Steam Navigation Co., a British organization, has announced its intention of establishing a line between New York and Valparaiso. The BOGOTA, with 8100-ton capacity, recently launched at Birkenhead, England, will be the first vessel put into this service. She is expected to reach New York early in June. The line intends to establish a regular passenger and freight service between New York and Valparaiso as quickly as the steamers are released by the government and thereby carry out plans drafted prior to the war.

The Cunard line has increased its capital and will build a large office building in New York to house its American headquarters. The Cunard has acquired the controlling interest in the Anchor line from Glasgow to New York and the Donaldson line from Glasgow to Canada, as well as absorbed some smaller lines. The line has opened new offices in Antwerp in the Hansa House in order to meet the peace time demand for passenger and freight traffic. The Cunard has made Southampton the eastern terminal for its express service to New York.

Oriental Market Is Weak

Charter conditions on the North Pacific have not changed greatly from a month ago. Spot carriers are still in demand while the market for space to the Orient continues weak. There have been ample carriers to handle business moving to China and Japan while vessels coming from the Orient have great difficulty in obtaining freight, some of them coming in ballast or only partly loaded.

The private lines operating to Far East ports are, as a rule, basing their bookings on the level fixed by the shipping board of $12 for weight and $14 measurement. There is a large quantity of steel and cotton moving from North Pacific ports and for the moment there is sufficient cargo to fill outgoing tonnage. However, with the lack of eastbound cargo and the uncertainty of what will be seeking space westbound the situation as a whole presents a problem. While some astute operators think the market

Establishes Record

PORTLAND, Oreg. (by wire), May 9.—The Columbia River Shipbuilding Corp., Portland, Oreg., on May 8 launched the 8800-ton steamer, CITY OF EUREKA, 27 days after the keel was laid. The vessel will be completely outfitted by May 17 which will make her ready for trial 36 days from the beginning of construction operations. The EUREKA is the nineteenth vessel to be launched by the company since its yard was established in March, 1917. So far this year, the yard has launched from its five ways 10 steel vessels of which eight have been delivered.

(Signed) Sydney Vincent,
Chamber of Commerce.

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may drop, the general opinion is that in the very near future there will be a steady rise in freights to the Orient with the probability of a $20 level being established within six months. As soon as peace is officially declared, the various governments withdraw restrictions and the markets of the world are adjusted, an unusually heavy commerce between Japan. China and North Pacific ports is anticipated. In eastern centers it has recently been reported that freight was being booked at $11 per ton to the Orient but no confirmation of this has been obtainable on the Pacific coast.

Siberian Market Now Open

Some interest attaches to the Puget sound-Vladivostok route. After two years of inactivity, cargo has begun to move again to Siberia. The shipping board has assigned several new steamers to this route and one private operator has dispatched a large carrier from Seattle with railroad equipment for the Siberian gateway. Other shipments are expected to follow soon. It is reported here that the Russian commission has awarded a contract to a private carrier for transporting 60,000 tons of railroad material from Seattle to Vladivostok at $21 per ton and although official announcement has not been made, it is believed that such business has been placed. Much of this freight has been in storage on the west coast for two years, its movement having been stopped when the Kerensky government fell. The shipping board has also assigned new steel steamers to Chinese and Japanese routes, under operation by private firms, but even without these carriers, conditions in this trade would now warrant the shipping board rate of 12 and $14 respectively.

Lumber Movement Is Heavy

There is a heavy movement of lumber and ties from the north Pacific to Atlantic ports and Great Britain. Numerous inquiries are constantly being received. The shipping board is employing some of its new wooden steamers to freight ties from Puget sound to New York and Philadelphia. Additional charters have been made for vessels to carry lumber and ties to Great Britain, the going rate being about $45. There are calls for vessels to take lumber to Belgium and Holland while other inquiries are for lumber vessels to freight cargo to Italian ports. To Genoa $60 has been offered but inasmuch as $75 is being paid from gulf ports, owners on the Pacific coast believe that the offered rate is too low.

Shipping board vessels continue to carry flour cargoes to the Atlantic. It is most uncertain whether Washington and Oregon will be able to ship grain to Europe this season or not, all depending on the attitude of the government. Vessels have already been fixed for barley from San Francisco to Scandinavian ports and it is possible the north Pacific may regain some of its before-the-war prestige as a grain exporting center this season.

Lumber rates to the Hawaiian islands, South America and Australia remain weak. There is little demand for lumber to these usual markets of the north Pacific. The foreign buyer hesitates to place orders with the market falling. Therefore, he is holding off in the hope that both lumber and freights will reach a lower level. Inasmuch as all foreign markets contiguous to the north Pacific are almost bare of lumber, great activity in lumber may reasonably be expected as quickly as the foreign merchant is satisfied that prices have touched the bottom.

Naturally, American operators are awaiting with interest the adoption of a definite government policy with reference to the merchant marine and it may be assumed that the Japanese are equally interested. In the meantime, conditions cannot but be uncertain. However, as soon as general business begins to adjust itself, there is every reason to expect an active commerce in all Pacific routes.

It is unofficially announced that the coast-to-coast steamship lines, which formerly operated out of Seattle but were withdrawn during the war, will return to the route in the near future and the building of a large water trade between Atlantic and Pacific ports is to be expected. The shipping board has assigned several small steel steamships to the Puget sound-Hawaiian route and this business, which had reached large proportions before the war, will soon be re-established.

The adoption of through rail and water rates from points in the eastern part of the country to the Orient has helped to clear the atmosphere but the new schedule is not altogether satisfactory to those operating through that gateway. It is claimed that Seattle, with respect to some commodities, is still under a handicap in competition with the all-water route from New York to Japan. Efforts are being made to set aside these differences and success is believed to be a matter of but a short time.

It may be stated that Pacific coast operators are not figuring on purchasing government wooden steamships, not because they are of wood but because of their design which is entirely unadapted for Pacific trades. For Pacific trade, ocean wooden vessels are built usually with engines and houses aft to make them available for carrying large deckloads of lumber.

Building Materials For France

Exports from Boston to Europe show no falling off although most of the consignments are for the various governments, the British reserving 70 per cent of space in vessels of that registry. Every ship for Liverpool, London and Glasgow is filled to capacity with grain, provisions, steel and flour. Leather has begun to be exported in considerable quantities after a long period where tanners could not have a foreign market. As much as 400 tons of leather has gone forward in one steamer since the ban was lifted. Tobacco is in demand abroad, consignments of 100 tons being common. Large quantities of flour are loaded in American and British ships which call at Falmouth, England, for orders, the ultimate destination being Germany. France is calling for food and Boston is responding liberally. Other food ships are dispatched to Rotterdam for the Netherlands government, and to Italy.

A sailing bark inaugurated the movement of building supplies for devastated France and other square-riggers will be chartered for similar voyages. Movement of wool from South Africa is heavy and the staple is being stowed in the army supply base which finds floor space congested. Apple exports have become negligible and the season's shipments totaled about 450,000 barrels. Advantageous charters are being made by vessels at Boston to proceed to Norfolk to load coal for Rio and Buenos Aires. Water rates on coal have not declined materially since the armistice but there is scarcity of tonnage for that trade. Taken as a whole, the outlook is bright.

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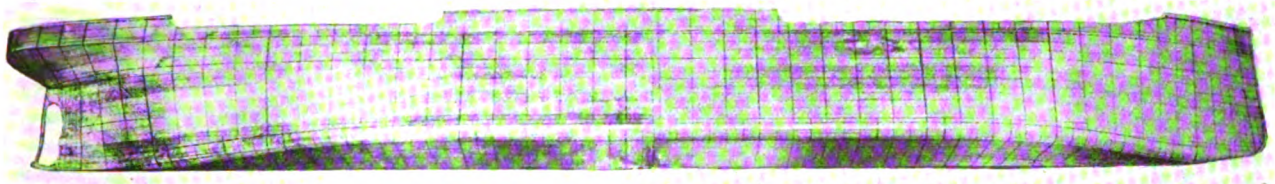
Steel Foundry To Cast Ships



By E. C. Kreutzberg

Fig. 1—Model of a 10,000-ton Cast-Steel Vessel 406 Feet 6 Inches Between Perpendiculars, 55-Foot Beam, 27-Foot Draft and 36-Foot Molded Depth to Shelter Deck—The Block Coefficient of this craft is 0.759

SATISFIED that its investigations and foundry demonstrations have proved the feasibility of cast-steel ships, the Cast Steel Ship Corp., New York, has plans actively under way to enter production without delay. Conceived as a measure for helping to relieve the shipping scarcity developed by the war, the practicability of this form of construction was not demonstrated until last summer. Chief of the difficulties which obstructed the plan for the manufacture of cast-steel ships was the necessity for perfecting foundry methods for producing the castings. This problem, after exhaustive experimentation, has been solved, and methods have been devised whereby the castings comprising the hull structure may be produced with a simple molding equipment at a moderate cost.

A thorough investigation of costs, in fact, has led the projectors of the cast-steel ship to the conclusion that vessels of this type can be produced in competition with vessels built by present methods. They claim a saving of 20 per cent. At the same time, the cargo carrying capacity of the cast-steel ship is expected to be 4 per cent greater than the capacity of ships made of rolled steel. Any lower cost, in turn, would be accompanied by a corresponding reduction in the fixed charges of operation, including interest, insurance and depreciation. These items, which on an average amount to 17 per cent annually for the usual type of vessel, are predicted by cast-steel ship advocates to be about 13.6 per cent at present figures. The extra carrying capacity, it is claimed, would more than offset the present difference in the cost of operating ships under American and foreign flags. It is stated that the increase in the cargo carrying capacity and the reduction of fixed charges will result in making it cheaper to operate these vessels under the American flag than it now costs to operate ordinary riveted ships under the English flag.

Among the most efficient steel ships of the Isherwood type being built in this country today of rolled steel, the ratio of the amount of steel in the hull to the deadweight cargo capacity is 1 to 4, for a 10,000-ton vessel. The cast-steel ship, it is stated, will carry between five and six tons of cargo per ton of steel in the hull. This

Plan to Build Ships by New Method

TO reduce production costs and to provide a vessel of maximum carrying capacity for given dimensions, the Cast Steel Ship Corp., New York, has developed plans for casting the component parts of ships. These parts are afterward permanently joined by welding. It is claimed for this process that it is practicable and that a large saving in labor costs is effected. Lloyd's, which has indorsed the welding of ships, has expressed its readiness to classify cast-steel vessels and while some naval architects have hesitated to depend on welded plates in ship construction, it is pointed out that the form of welded joint described in this article should meet with approval. The plan of making cast-steel ships is new and a number of advantages are claimed for it. The outcome will be watched with interest by naval architects, shipbuilders, shipowners and others interested in maritime affairs.

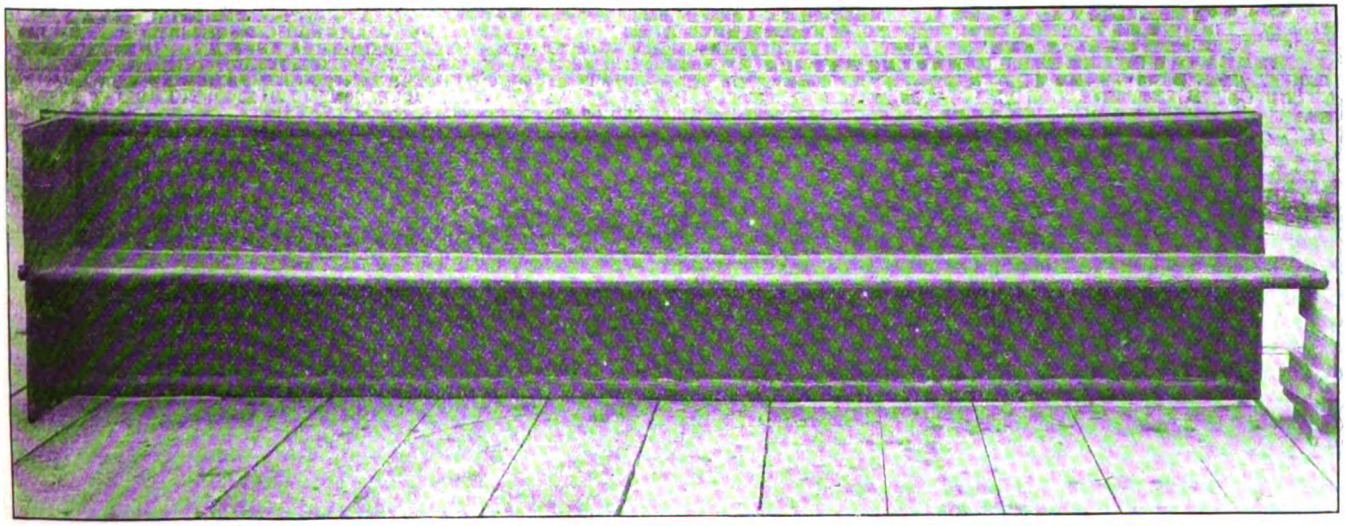


FIG. 2—TYPE OF STEEL CASTING USED IN ALL PARTS OF THE SHELL, TANK TOP, BULKHEADS AND DECKS—THE T-SECTION AND RIBS INSURE AMPLE STRENGTH

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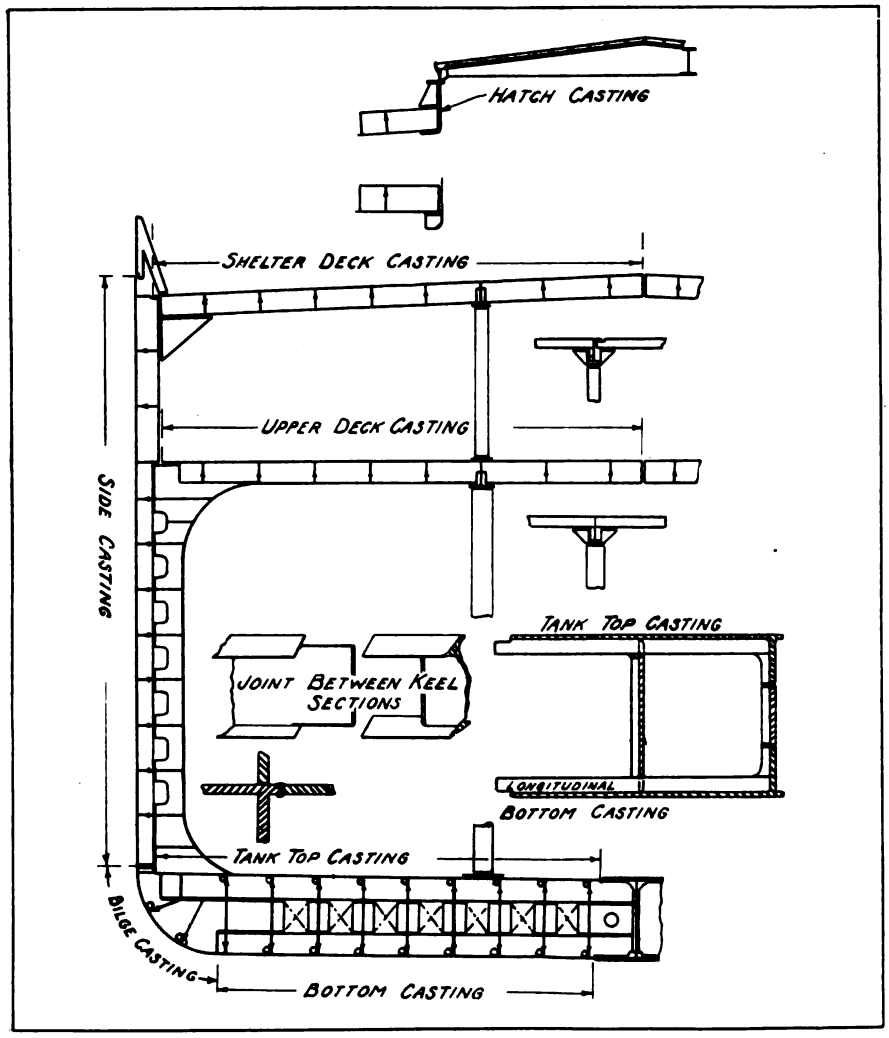

FIG. 3—DETAILS OF MIDSHIP SECTION OF CAST-STEEL SHIP SHOWING ARRANGEMENT OF CAST-STEEL MEMBERS

increase in cargo carrying capacity is based upon the fact that the angles, clips, etc., necessary to join the plating and framing of the riveted ship's structure are eliminated.

The joints between the plating and framing of the cast-steel ship are to be cast without excess metal. A cast-steel ship, therefore, with 20 per cent less metal in the hull, will have, it is claimed, a greater strength than a riveted ship of greater weight. By utilizing this factor, the weight of the cast-steel hull of a 10,000-ton deadweight cargo ship be reduced from 2500 tons to 2000 tons, while the cargo carrying capacity is correspondingly increased.

Great advantage, it is claimed, will result from the much smaller number of parts of which the cast-steel ship is to be built. In the ordinary rolled steel vessel of 10,000-ton capacity, there are more than 20,000 major parts, including plates and angles, to be fitted and riveted. The cast-steel vessel of similar deadweight capacity will have less than 2000 major parts, thus permitting a great saving in assembling time. As a result, it is predicted that after standard methods of handling the castings have been developed at the yards which will produce cast-steel ships, the erection of a hull will be a matter of weeks instead of months, thus reducing overhead costs of construction.

Lloyd's, which has indorsed the welding of ships, has expressed its readiness to classify cast-steel ships. While welding has been applied successfully to several hulls already, some naval architects and ship operators hesitate to depend on plates merely welded edge to edge for fear, by unusual chance or accident, an important seam might be inefficiently welded. This objection is overcome in the cast-steel ship, it is stated, by the use of an interlocking cast joint, as shown in Fig. 4. This joint is used in the shell, decks, tank top, and bulkheads. It does not depend on the weld for its reliability. Even if the weld in places entirely fails to adhere, the members could not part and the worst that could happen would be a leak. Because of the manner in which the cast plates overlap, such leaks can be caulked and rendered tight until the weld is repaired in port.

The design of the cast-steel ship differs from that of the ordinary steel ship in that the framing in the forward and after bodies is at right angles to the shell. This form of design was adopted in order to do away with the multiplicity of molding equipments that would be required to provide for the different angles

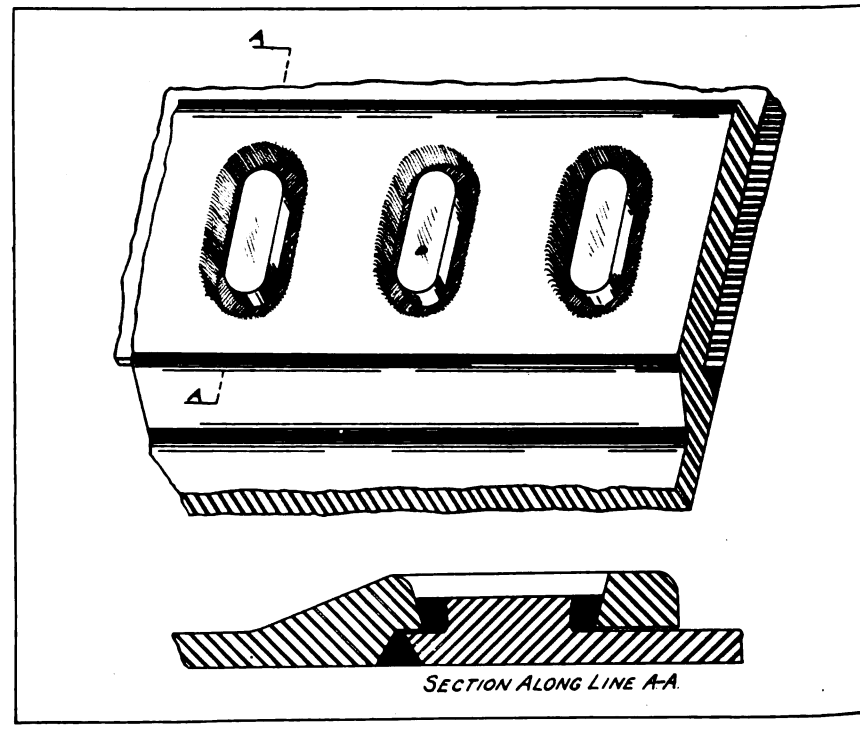

FIG. 4—INTERLOCKING JOINT DESIGNED FOR USE IN SHELL, DECKS, TANK TOP AND BULKHEADS OF CAST-STEEL SHIP

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formed by the junctions of the ordinary framing and shell. By this design it is possible to make all castings for the ship, except those in the bilge, with one molding outfit, in which the thickness and depth of the framing may be varied in the sand. As shown in Fig. 2, the framing is cast solid with the shell.

Methods of production already have been standardized. Castings for either the transverse or longitudinal system of shipbuilding, and for ships of almost any size are possible. One large mold comprising a number of units may form the castings for the shell, deck, tank top and bulkhead with extra equipment for bilge forms and other details. In making ship castings for the Isherwood system, sections may be cast from one main transverse frame to and including the next. The castings for the side of the hull, for the bottom, tank top, decks and bulkheads are of the same type, each including the plating and the corresponding portion of the transverse frames, beams or stiffeners, and each including also the corresponding portions of the longitudinals and of the margin plates or girders, as the case may be.

The bottom has two castings, one from either side of the keel casting to the bilge casting. The tank top has the same number. A side casting of the hull extends from the bilge casting to the gunwale. These castings are varied in design to meet the requirements of the hull in the forward and after bodies but the general system is the same. The deck castings are nearly duplicates of the tank top castings, with some variation in size where they meet the hatchway castings. Their edges are modified in the fore and aft bodies, by shaping the sand in the molds to fit the curves of the hull at the deck levels. Bulkhead castings resemble the side castings of the hull, being provided with similar longitudinals and vertical stiffeners.

The thicknesses of the various parts of the different castings may be altered to suit hull requirements by scraping off more or less sand from the mold surfaces. The mold units are prepared by a sweeping process, no solid patterns being necessary.

The edge of the plate portion of a casting is united to the edge of the next. The stiffeners of one casting are also joined, end to end, to those of the next casting. The joints being over 100 per cent in strength, shifting of butts is unnecessary. Bolting is eliminated as the form of the joints permits wedges to be employed to tighten the edges for welding. Curves and warping of castings for ship form purposes is accomplished in the annealing oven. The straight line hull simplifies this process.

The flasks are permanent and of such shape that only a small amount of sand is required for each mold. This, it is claimed, obviates the necessity for skilled molders and reduces the amount of manual work per ton of castings to a minimum. For pouring the thin sections which characterize these castings, a deoxidized steel will be employed. This is produced in an electric furnace. The steel in these castings contains 0.25 per cent carbon, has a tensile strength of 70,000 pounds, an elastic limit of 38,000 pounds and an elongation of 28 per cent in 2 inches.

Fig. 4 illustrates the method of assembling the keel sections and ship sections of a cast-steel ship. As illustrated by this view, each half-ship section is comprised of three castings forming the shell, one casting forming the tank top, and two castings forming the decks, making a total of six castings in the midship section for each side of the ship. It is of interest to note that the variations in the duplicate castings, occurring during contraction, for the most part are met by assorting and matching them. The overlapping joints are designed to allow for much of the variation that may occur. It is believed that, as a result, it will be necessary to trim comparatively few of the castings.

Through a syndicate of shipbuilders, the Cast Steel Ship Corp. expects to cover its foundry needs. The first castings are being made in Chicago, the ship to be assembled on the Atlantic coast, within the next few months. Owing to the speed with which vessels of this kind are expected to be assembled, it is thought that one or two ways will suffice for assembling and launching a large tonnage.

The Cast Steel Ship Corp. was recently organized under the laws of New York state, with offices at 114 Liberty street, New York, to establish the production of cast-steel ships as an industry. The president of the company is Myron F. Hill, who has been a member of the committee on welding of the Emergency Fleet corporation. Mr. Hill, who is the inventor of the cast-steel ship and who designed the methods to make their production possible, originally undertook this project to supply a new source of material and labor for ships. The Cast Steel Ship Corp. will act as naval architect only.

According to a recent dispatch from Dawson, Alaska, the ice is beginning to break up in the Yukon river. It is expected that the big stream will be open to navigation by the latter part of May. The first hydraulic mining operations were begun late in April.

M. T. Davidson 1837-1919

Marshall Ten Broeck Davidson, president of the M. T. Davidson Co., manufacturer of pumping machinery, Brooklyn, N. Y., recently died at his home in Brooklyn. He was born in Albany, N. Y., in 1837, and early in life developed an interest in steam machinery, especially steamboat engines. In 1857 he began work in a marine-engine machine shop in New York and later served at sea as assistant engineer on deep water.

When the Civil war broke out he was an assistant engineer on a steamer running from San Francisco to Puget sound ports. During the Civil war he served as chief engineer on an army transport. Later he was in the revenue cutter service.

After the Civil war ended, Mr. Davidson became a contracting engineer and in 1878 he founded the M. T. Davidson Co., to build pumps and pumping engines. He was closely identified with engineering progress in the United States navy. His practical knowledge of engineering as applied to pumping machinery placed him in a high rank in that line. His favorite study was marine work and the development of pumping installations for use on shipboard.

Mr. Davidson enjoyed the distinction of being one of the oldest members of the American Society of Mechanical Engineers and also was a member of the Society of Naval Architects and Marine Engineers, the Naval Order of the United States, Associate Society U. S. Grant Post No. 327, the Columbia County association, life member of the Navy league and was from its conception an active and life member of the late Union League club of Brooklyn.

Ship Clearing House

To facilitate the bringing of vessel buyers and sellers together, the International Maritime Clearing House, New York, has just been organized. The plan is similar to that followed by stock and grain exchanges and clearing houses which offer means for transacting business along economic lines. Names of vessels and full descriptions will be available for prospective buyers while the seller will have the advantage of the widest possibe market. In reality, the plan calls for bringing buyers and sellers together with the least effort and delay.

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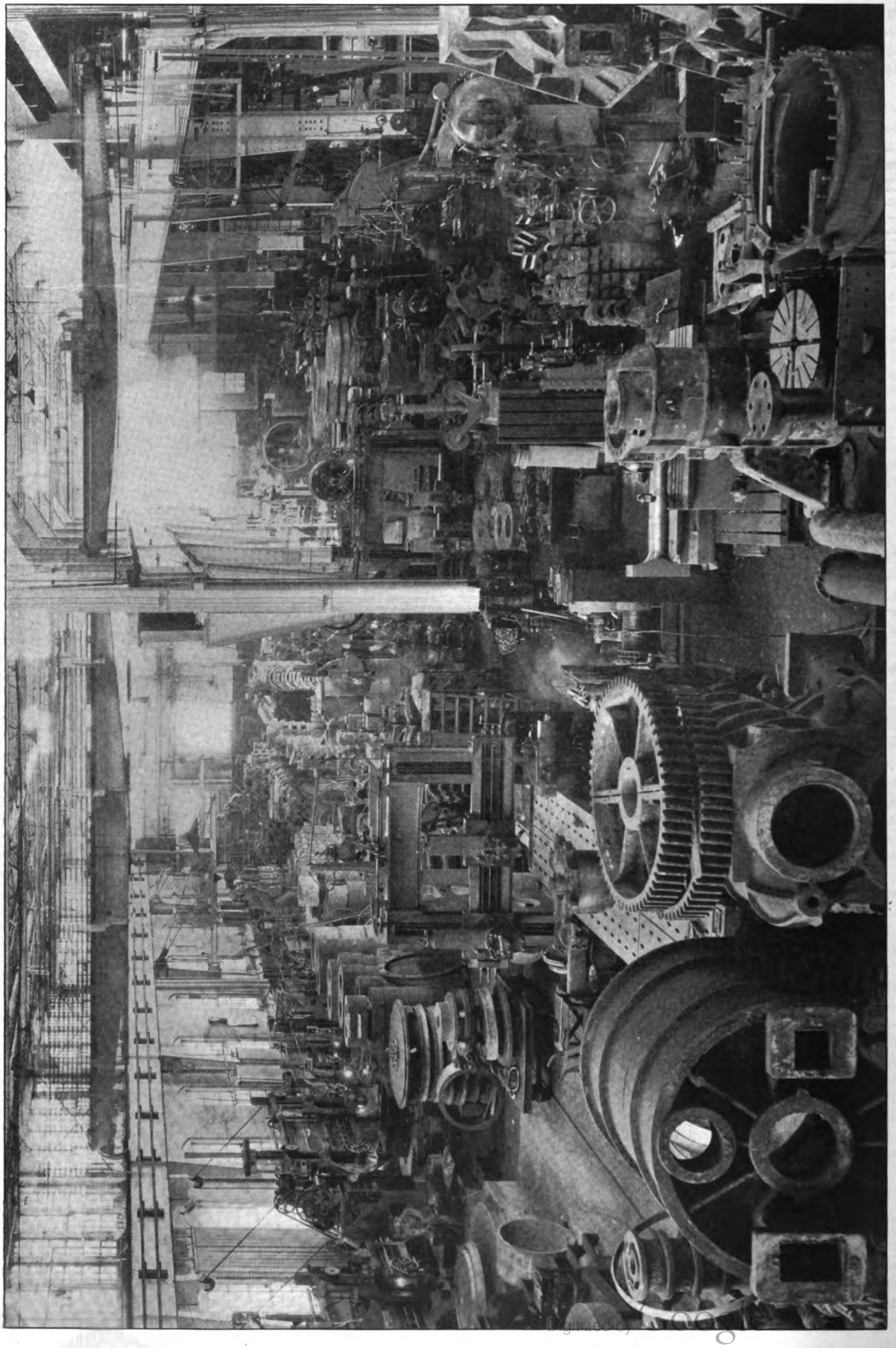

FIG. 1—GENERAL VIEW OF THE HOOVEN, OWENS, RENTSCHLER CO.'S MACHINE SHOP WHERE MARINE ENGINES FOR THE EMERGENCY FLEET CORPORATION ARE BEING BUILT—THIS COMPANY IS DELIVERING FOUR COMPLETE 2800-HORSEPOWER ENGINES A WEEK

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Building Marine Engines on a Quantity Basis

By F. B. Jacobs

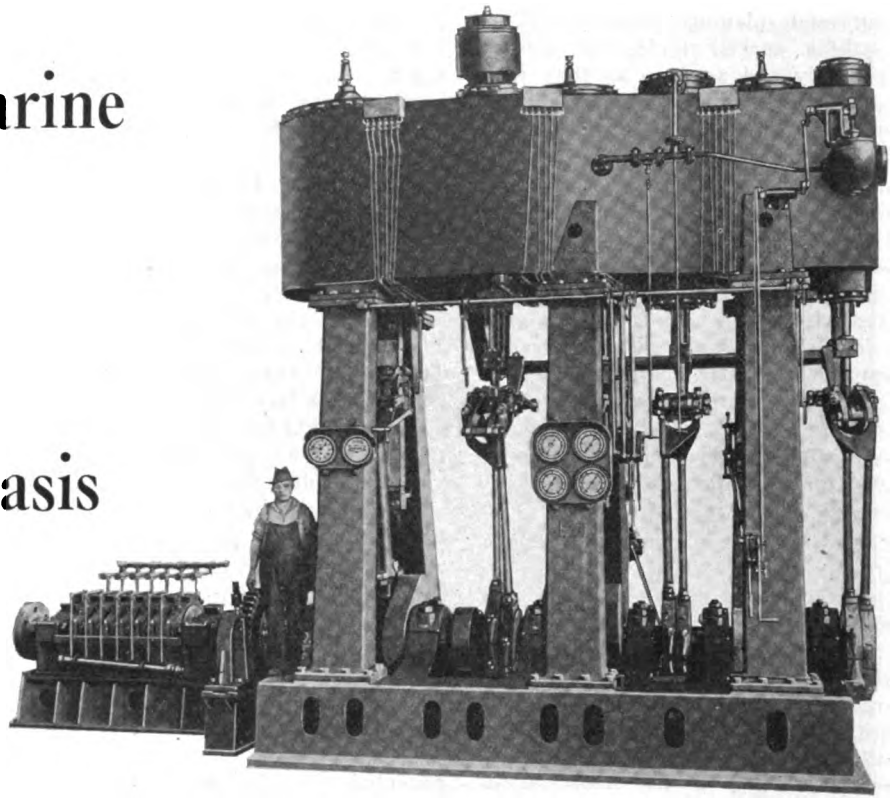

Fig. 2—Three-cylinder, triple-expansion, inverted type 2800-horsepower marine engine built for the Emergency Fleet corporation

How the Problem Was Solved

PRODUCTION of marine engines on a quantity basis is a recent innovation brought about by the necessities of war. With shipyards on the Great Lakes, the east, west and gulf coasts working night and day to turn out ocean going tonnage, unusual measures had to be developed to produce engines to propel these craft.

Up until that time, several complete engines a year was considered sufficient production for one plant. The Hooven, Owens, Rentschler Co., Hamilton, O., successfully rose to the occasion in producing the necessary engines on a quantity basis. By means of jigs and special tools, these massive 2800-horsepower engines were "tooled up" much after the manner in which automobile engines are made in large quantities. At the present time, four complete engines per week are completed and shipped to tidewater and Great Lakes ports. The foundry is producing castings for one complete engine a day.

This is the first of a series of practical articles describing manufacturing operations at the Hamilton plant. This installment deals with heavy units such as the cylinders, crankshafts, columns, bed plates, connecting rods, etc. The second article will describe manufacturing operations on smaller units such as valve gears, main and connecting rod boxes, thrust bearings, etc., while the last installment will describe assembling operations.

FIVE years ago, had anyone predicted that one concern with but a slight increase in capacity, could deliver four complete 2800-horsepower marine engines a week, his statement would have met only amused incredulity. Yet, today, this feat is being successfully accomplished by the Hooven, Owens, Rentschler Co., Hamilton, O. Complete engines are leaving this plant almost daily, consigned to ports on the east, west and gulf coasts, and the Great Lakes. The company's foundry has been producing one complete set of engine castings daily for months.

How this engineering feat was successfully accomplished forms one of the most interesting chapters of the industrial history which American engineers wrote during the war. It is a story of American mechanical genius, a record of adapting new methods to existing facilities and as a result supplying marine engines on a quantity basis to the growing fleet of cargo carriers being built for emergency war service.

The Hooven, Owens, Rentschler Co. has manufactured corliss-type stationary engines for rolling mills, power plants, etc., for many years. The company operates its own foundry in connection with its machine shops, its engineering department is thoroughly organized, its machine tool equipment is modern, while the skilled mechanics employed are experts, each in his own line. Many of these men have been with the company since serving their apprenticeships. Thus, they have grown up with the business and understand their work thoroughly. Taken collectively, this high standard of personnel had much to do with the success attained in breaking all precedents in rapid marine-engine construction.

At the request of the government, the company turned its attention to marine engines in October, 1917. The company announced that it was in a position to deliver two complete 2800-horsepower engines a week. This estimate was not given much credence by the government, owing to the fact that the mandates of time-honored precedent ruled that it took many weeks to produce cylinders alone.

After negotiations were completed, the government placed an order for engines and the company entered production. The first engines built were of 1400 horsepower, designed for installation in wooden vessels. Later, the company built some 850-horsepower engines for tugboats and finally was awarded a contract for 2800-horsepower engines. It is with this type of engine that the present series of articles has to deal.

As soon as the contract for these engines was signed, the engineering department immediately began the design of jigs and special tools for quantity production of various parts. In this category were included drilling jigs and various milling, assem-

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bling and planing fixtures. Work on these special tools was pushed vigorously and as soon as they were finished and put in production, the company's output rose to four engines a week where it remains at present.

The engine in question has cylinders 24½ x 41½ x 72-inch bore with 48-inch stroke and is of the 3-cylinder vertical inverted direct-acting type, fitted with Stephenson-link valve gear. It is designed for a piston travel of approximately 700 feet per minute. It turns 88 revolutions per minute and takes steam at 200 pounds, boiler pressure, and develops 2800 horsepower under normal conditions, without live steam in the receiver.

The bed plate is cast iron, made in three sections. The cylinders are semisteel, each cast separately and bolted together with all valve chests facing forward. The high-pressure cylinder has a separate cast-iron liner, forced in. This liner is made of hard, close-grained material. The walls of the intermediate and low-pressure cylinders are made amply thick to allow for reboring. The high-pressure and intermediate cylinders are fitted with balanced piston valves while the low-pressure cylinder has a double-ported semibalanced slide valve. The high-pressure and intermediate valve chests are provided with cast-iron liners.

The high-pressure cylinder faces forward. The sequence of the cranks is, high pressure, intermediate and low pressure; cranked 120 degrees apart. The columns are cast iron box sections with crosshead guide bars bolted to the front and back housings.

The exhaust from the high pressure to the intermediate cylinder is through a cast-iron pipe. The exhaust pipes from the intermediate to the low-pressure cylinder are cast integral with the intermediate cylinder. The by-pass steam pipes are copper. The high-pressure and intermediate valve chests are so arranged as to allow straight ports being between the chests and the cylinders.

The cylinder clearances are ⅜-inch at the top and ⅝-inch at the bottom of each cylinder. The clearance and striking points are plainly marked on the crosshead guides.

Valve Gear is Counterbalanced

The handling station is at the starboard side with the throttle and reversing gear on the front high-pressure housing. The valve gear is provided with linking-up screws for the purpose of changing the cutoff of each cylinder separately. Balance pistons and cylinders are provided for counterbalancing the weight and inertia of the valves and valve gear. The valves take steam as follows: High pressure, inside admission; intermediate, outside admission and low pressure, outside admission. The main cutoffs are: High pressure, 76 per cent: intermediate, 72½ per cent and low pressure 70½ per cent.

Reversing is by means of a single cylinder bolted to the intermediate back column. It has floating links and levers and is operated from the handling station. The turning engine is of the single-cylinder engine type which actuates a cast-iron worm gear on the crankshaft. The thrust bearing is of the horseshoe type.

The main bearings, crank pins, eccentrics and thrust and shaft bearings are cooled by water service from the sea while the water service in the guides is part of the sanitary system.

Lubrication is from a distribution box placed on each main cylinder so as to be easily reached from the engine-room grating. Each crank-pin has two oil pipes while all working parts of the valve gear are fitted with oil cups. Reverse shaft bearings have compression grease cups. The main bearings have brass boxes with covers, tubes, wicks and grease buckets. Water troughs are fitted for the eccentrics to dip in.

The following instruments are mounted on two cast-iron gage boards which are fastened to two of the engine front columns; Eight-day clock, main steam gage, intermediate receiver gage, low-pressure receiver gage, vacuum gage and a revolution counter.

To insure ready repairs at sea in case of breakdowns, each engine is supplied with a quantity of spare parts which are fitted, ready for use. These spare parts include the following: One pair of top brasses for connecting rod, one pair of bottom brasses for connecting rod, two connecting rod crosshead-end bolts complete with nuts, two connecting rod crank-end bolts complete with nuts, two main-bearing bolts complete with nuts, one high-pressure valve stem complete, six follower studs for each piston, one set of springs for each piston, two piston rings for high-pressure piston, two piston rings with dowels and tongue pieces for intermediate piston, one piston ring with dowels and tongue pieces for low pressure piston, one set of coupling bolts for one coupling, 12 studs for cylinder covers, six studs for valve chest covers, three valve guards with studs and nuts for air pump, three valves complete for air pump, one set of valve seats for bilge pump, one valve guard for bilge pump, two valves with springs for bilge pump, one top high-pressure piston-valve ring and one bottom high-pressure piston valve ring.

In its foundry, the Hooven, Owens, Rentschler Co., through long experience, was thoroughly familiar with molding large castings. The work of casting the three most important units of the engine, the cylinders, was successfully accomplished from the start. Some idea of the size of these castings can be gained from Fig. 3. A few years ago, six weeks was thought to be a short time in

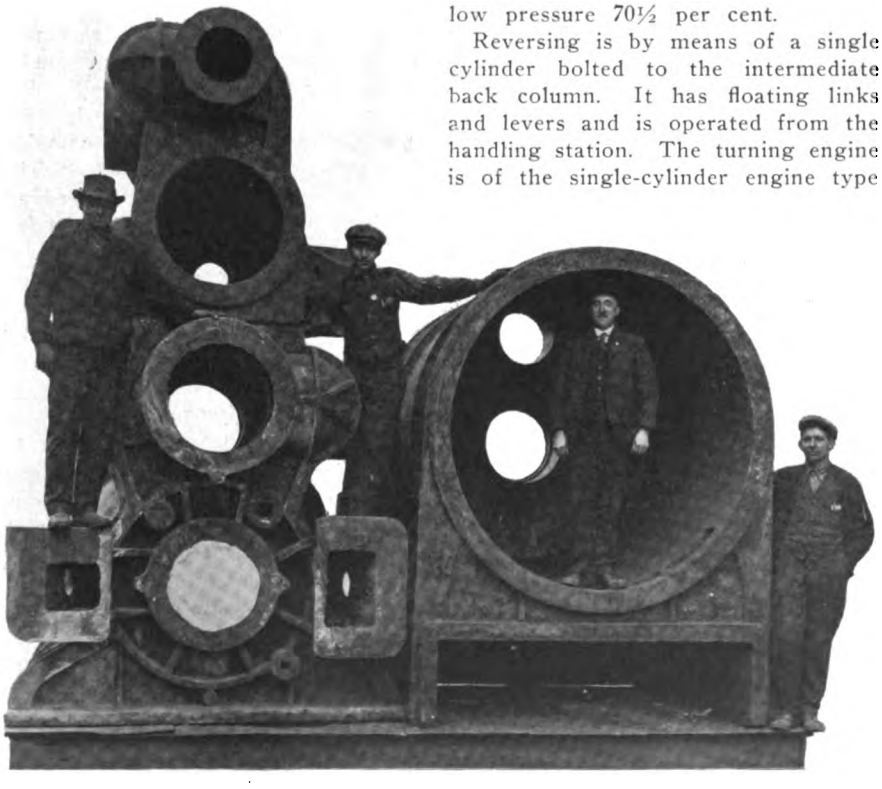

FIG. 3—HIGH-PRESSURE, INTERMEDIATE AND LOW-PRESSURE CYLINDERS AS THEY COME FROM THE FOUNDRY—THESE ARE SEMISTEEL CASTINGS

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which to mold and cast the intermediate cylinder alone, and the fact that the foundry is turning out six complete sets of cylinder castings a week is ample evidence that the demands of rapid production have been met by devising improved methods in molding practice.

The foundry operations are interesting. For many years it has been the established practice to mold these large cylinders with the heads down but this foundry saves time by molding them with the heads up. It used to require half a day to black one of these large molds but through the use of a spray nozzle, this time was cut to half an hour or less. Again, the drying of these large molds with charcoal fires used to require days but the utilization of waste space allowed an entire cylinder mold to be dried in 12 hours.

To assemble the cores in the molds on this class of work often required many days while the complete building up of the mold sections with all the cores for a large cylinder often consumed several weeks time. It this foundry the cores were bunched on a common arbor, larger cores were grouped and baked together and assembling crews put together an entire cylinder mold in less than a day. The high-pressure intermediate and low-pressure cylinder castings weigh respectively 21,200, 21,300 and 22,900 pounds.

Adequate foundry equipment had much to do with the success attained in getting out these huge castings in record time. The flasks for the cylinder job were built at the foundry to the superintendent's specifications. Strength is assured through side flanging while the flask sections are securely fastened together by bolts at the four corners. Each end of the flask has a loop cast for the accommodation of the crane-fall hook. The continuation of the sides and the end flange connections are rounded to form a cradle for rolling over the flasks. The object of this is to lessen the jar when the flask is rolled over.

All molds are rammed up on machined plates which insures level surfaces. The plates are set on firm foundations. The flasks are matched by means of two 1-inch guide pins at opposite ends, the holes for which are drilled by means of templates to insure proper registry.

How Molding is Expedited

Each cylinder is molded in four units, a practice which insures convenience in handling. These units comprise the drag and barrel core, the lower cheek, the upper cheek and the cope. In each case the cope carries the mold for the cylinder head. Three full patterns are provided for cylinder work. One crew is employed in ramming drags, two others on cheeks, one on copes and another on assembling. This division of operations insures teamwork and has been productive of high efficiency.

The drag and barrel cores are made together. The drag flask is first rammed full of sand. Next a spindle is set at a central point from which loose pieces are located and bedded in to form the portion of the bottom of the cylinder which is carried in the drag. Then the core cylinder is rammed in a cylindrical hollow box. The sand mixture consists of one-half old and one-half new material with no compound. Each drag is baked over night in a gas-fired oven. The next day the valve chamber core for the low-pressure cylinder is set in place, all bolt holes, etc., are filled and the drag with the new core added is again baked.

The drag for the high-pressure and intermediate cylinder is ready for assembly after one night's baking. In this way, two complete sets of flasks for each cylinder are required.

The high-pressure cylinder is a complicated piece to mold as the

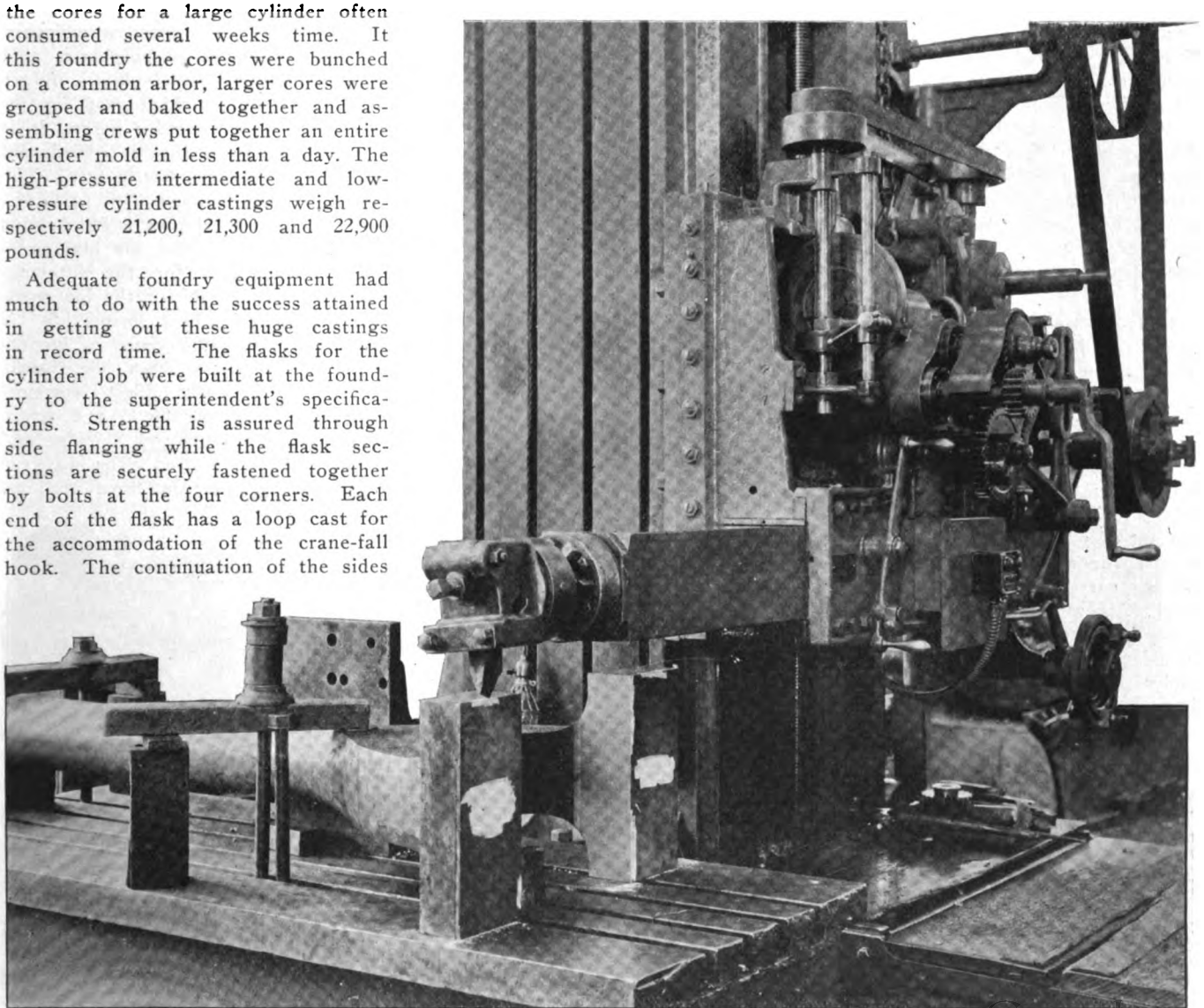

FIG. 4—PLANING THE ENDS OF A CONNECTING ROD ON A DRAWCUT SHAPER—THESE MEMBERS ARE HAMMERED FORGINGS, FINISHED ALL OVER

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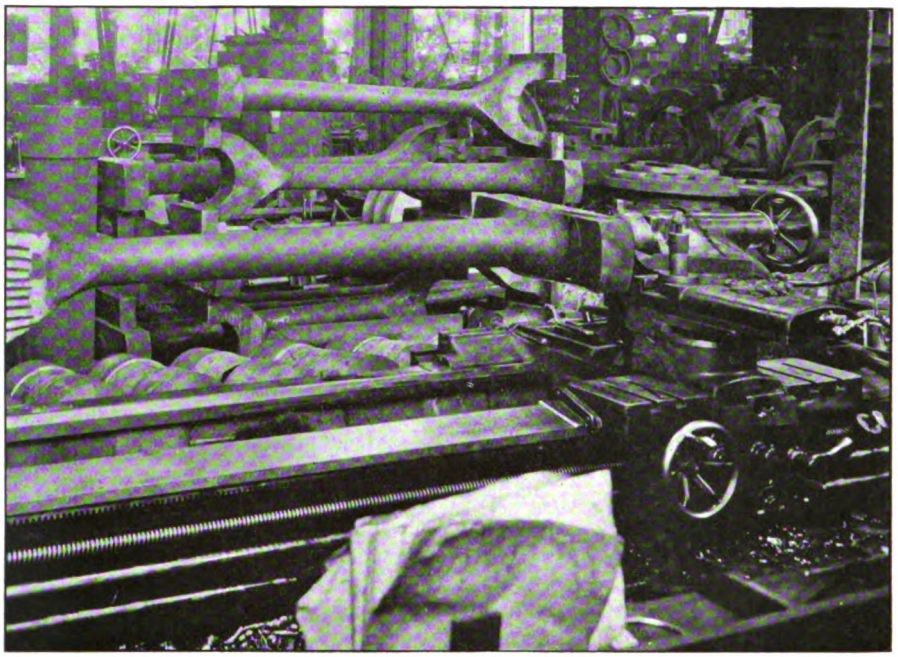

FIG. 5—SQUARING THE ENDS OF CONNECTING RODS IS DONE ON THE ENGINE LATHE, BETWEEN CENTERS

core for the piston-valve chamber requires careful setting. To save time in setting the cores in place, a number are assembled on one arbor. The intermediate cylinder, however, is the most difficult to mold. The cores for the ports are made in sections, split horizontally, to facilitate setting. The lower half is placed in the drag before the first cheek is in place. The cheek is then set and the upper section of the port core is set in place.

Intermediate cylinder molds are assembled before 2:30 in the afternoon. The molders begin work at 6 a. m. Care is exercised in every core setting operation, a measure absolutely necessary if accurate results are desired. Used ground core sand, mixed with a small amount of pitch, is employed for all of the larger cores in this work. Arbors for these cores are used in abundance, a bed of molds for these being in readiness at all times in which the superfluous metal from castings is poured. Cores are baked by natural gas in underfired ovens, each provided with a single burner. Pyrometers are used to regulate the heat which insures properly baked cores.

The low-pressure cylinder is the simplest to mold as the cores are not so complicated. The barrel core is equipped with a chill flange at the top, the object of which is to provide against segregation between the cylinder walls and the head. After flasks are assembled into complete molds, clamps are wedged at frequent intervals to take all the lifting stress in the mold when the molten metal is poured. A runner box is placed on the top of the mold and feeds a number of sprues. These lead directly to the falls of the cylinder. The metal flows to the bottom along this wall and feeds up into the other portions of the mold.

The tops of the cylinders are provents are plentiful. Separate vents for each core section are carried to the outside of the mold. A 25 per cent steel mixture is used in these castings and about 40 tons of this metal is poured daily.

The cylinders are generally poured between 2:30 and 3:30 p. m. They are allowed to remain in place until the night shift comes on at which time they are taken to the shaking-out floor. After the castings are shaken out, the flasks are sufficiently cool to be used again the next morning.

The castings are cleaned of sand by pneumatic tools after which they are immersed in a sulphuric acid pickling solution for 24 hours before removal to the machine shop for inspection. Each cylinder before it is accepted for machining is sealed and subjected to a hydrostatic test. The pressure which must be sustained without leaks developing is 300 pounds to the square inch for the high-pressure, 150 pounds for the intermediate and 50 pounds for the low-pressure cylinder. This inspection is made under the supervision of inspectors from the Emergency Fleet corporation, the American Bureau of Shipping and Lloyd's. The base is cast in three sections.

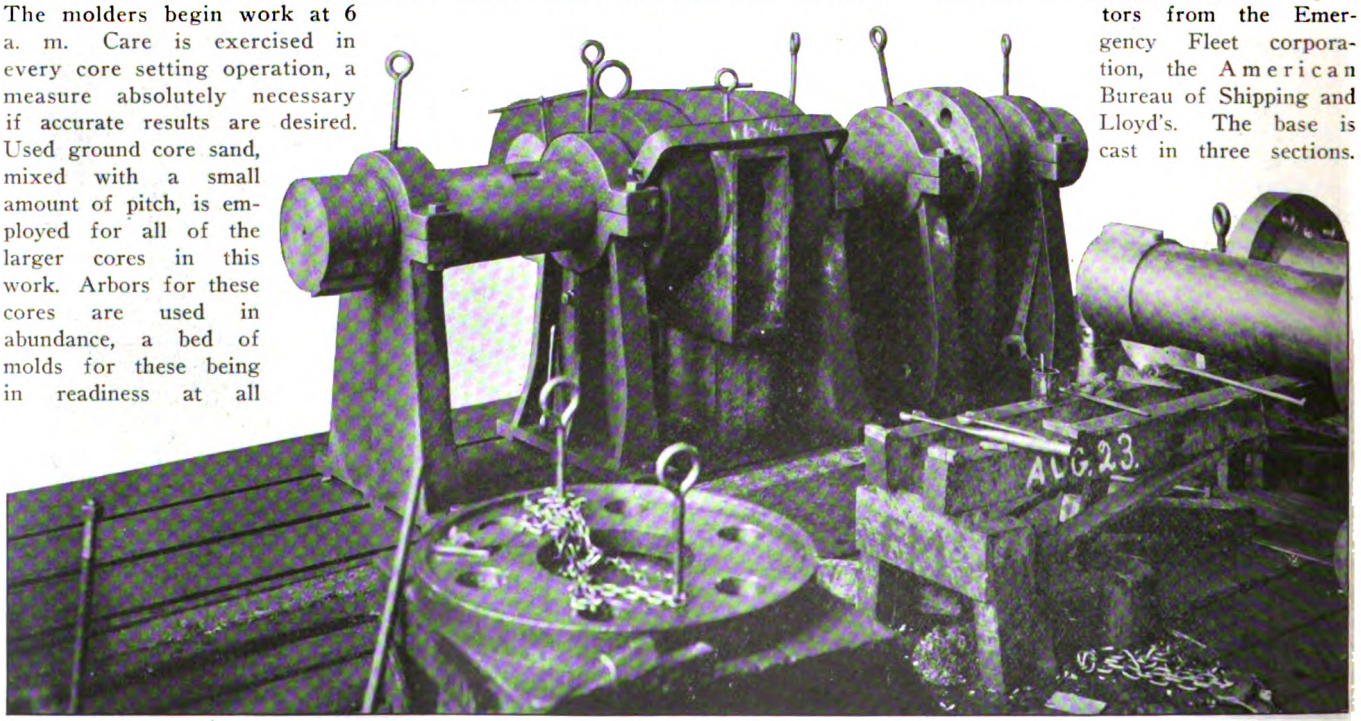

FIG. 6—ASSEMBLING FIXTURE USED IN LOCATING THE CRANK WEBS ON THE SHAFTS AND PINS IN THE SHRINKING OPERATION—ON THIS OPERATION DEPENDS IN A GREAT MEASURE THE ACCURACY OF THE FINISHED CRANKSHAFT

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These are molded in heavy flasks which are accurately machined and fastened together with two guide pins, one at each end. The holes for these are drilled by means of a template to insure accuracy. The large square core which forms the crank pit is made on a plate to facilitate handling, finishing and setting. The greater portion of this casting is molded in the drag. It is molded bottom up with the curved portion in the cope.

Molds for the columns are made in two flasks. The mold is poured from the bottom in order that any slight amount of dirt may be caught under the core and thus prevented from reaching the upper edge of the casting. All marine engine castings must be sound as they have to pass close inspection before machining.

While great care is exercised to see that none but sound castings are delivered to the machine shop, greater care must be used in conducting the various machining operations as otherwise castings that represent a considerable outlay in time and material might be rendered valueless.

The bed sections as they come from the foundry are first roughed out all over on a planer, after which the ends that are to be bolted together to unite the three castings into a complete bed are carefully planed by facing with the down feed. The sections are then drilled for bolt and dowel holes and firmly fastened together. The object of the dowel pins is to facilitate accurate resetting in case it should be necessary to disassemble the unit at some future time. After joining together, the bed is again taken to the planer where a finishing chip is taken over the top and the bottom of the casting.

A coarse feed in connection with a goose-neck finishing tool is used for this operation. The object of the coarse feed is to insure the tool getting over all the casting without wearing away to any extent, thus insuring parallel surfaces.

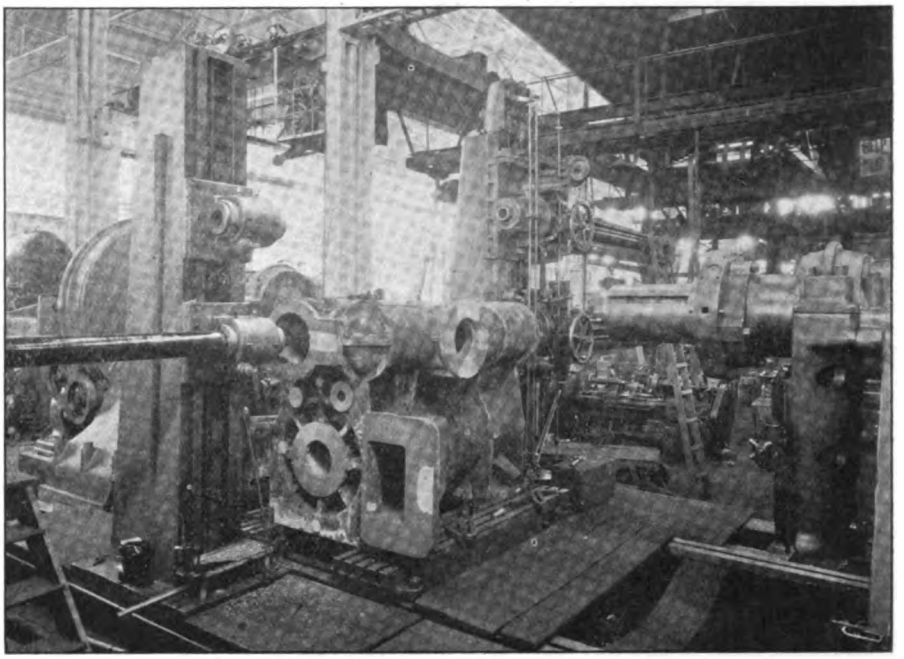

FIG. 8—BORING THE SEAT FOR A HIGH-PRESSURE VALVE IN A HORIZONTAL BORING MILL

The next step is to finish the seats for the main bearings. These must be accurately machined to insure a good fit and they must all be in line to insure the shaft being fitted without unnecessary scraping. The bed is carefully tested to make sure that its upper surface is flat and true, otherwise trouble would develop when the engine was assembled. The bed is now taken to a radial drill where the various holes for bolts, etc., are drilled, reamed and tapped. The columns also require careful finishing. Work on these parts consists of planing the bottom, the seat

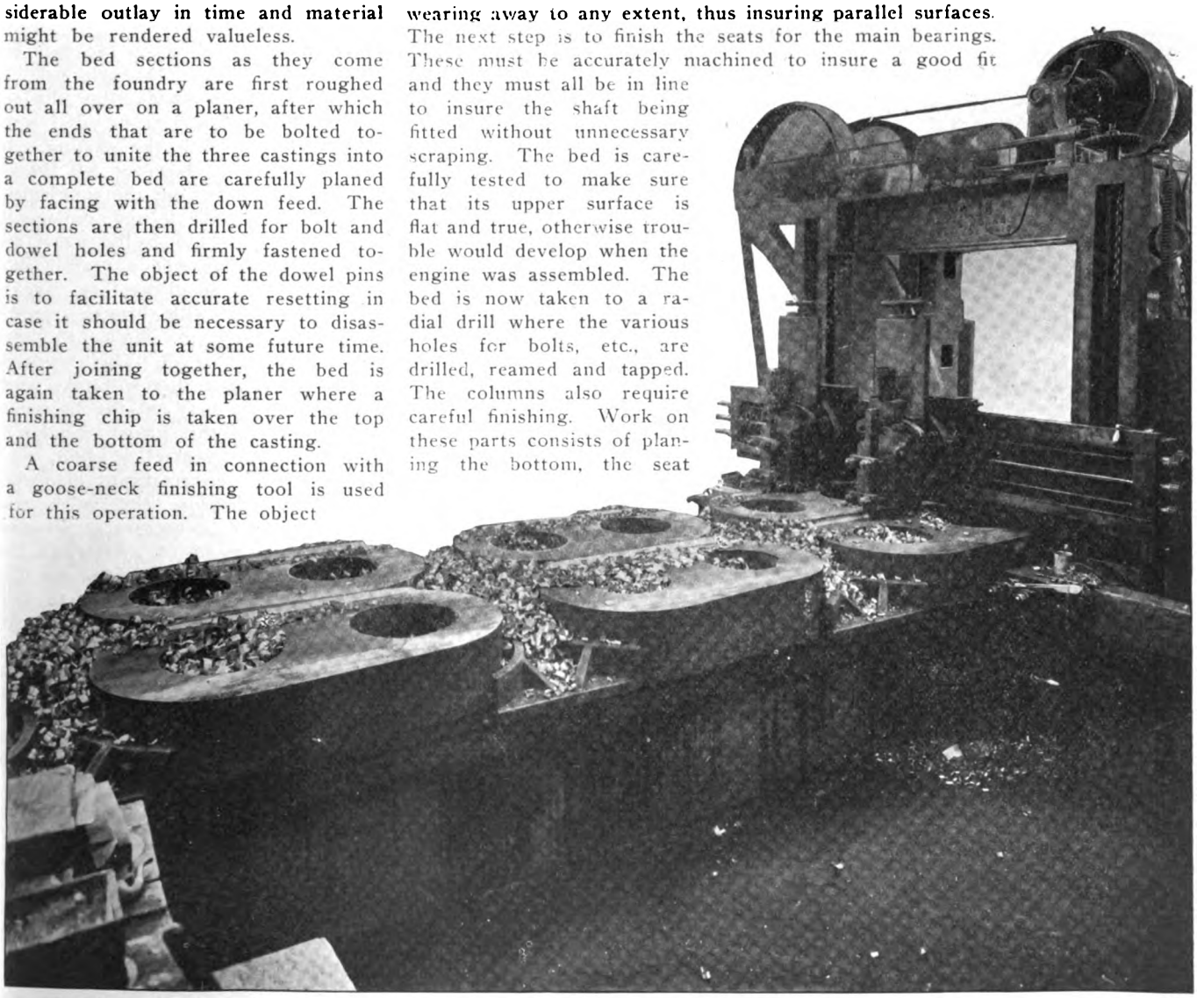

FIG. 7—HOW THE CRANK WEBS ARE SURFACED—SIX OF THESE MEMBERS ARE LOCATED ON THE PLATEN OF A 60 X 60-INCH PLANER AND SURFACED AT ONE OPERATION—THE CHEEKS MUST BE PARALLEL TO INSURE ACCURACY

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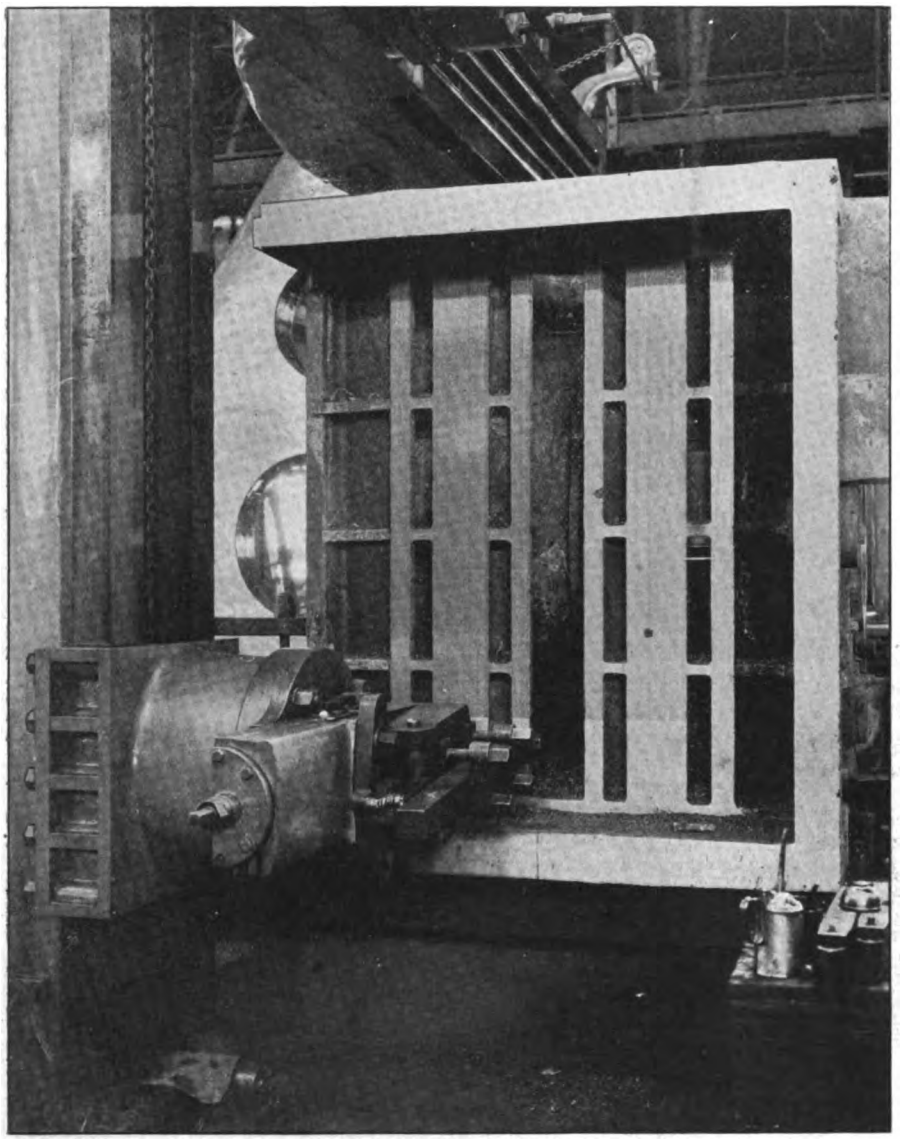

FIG. 9—THE HUGE PLANER ON WHICH THIS LOW PRESSURE VALVE-SEAT FACE IS PLANED WILL TAKE WORK 13 FEET BETWEEN THE HOUSINGS—IN THIS ILLUSTRATION THE FINISHING CHIP IS BEING TAKEN

for the crosshead guides, the top which fastens to the cylinders and bosses for the reverse shaft brackets, etc. The surfaces requiring the most careful finishing are the upper and lower ends and the seat for the crosshead guides. It is obvious that the upper and lower ends must be parallel to insure correct assembly as these units connect the cylinders with the bed plate. Again, the seat for the crosshead guides must be true to insure correct alignment between the crosshead and piston travel. After planing, the various holes for bolts and dowel pins are drilled, reamed and tapped which completes the machining operations on these parts.

Among the most important units to machine are the cylinders, for on the accuracy of these members depends to a great degree the economical working of the finished engine. It is obvious that a true-bored cylinder is economical in steam consumption while one that is bored egg-shaped, which sometimes happens, permits live steam to escape past the piston and into the exhaust without performing any work.

The first operation on the low pressure cylinder is to bore it. These cylinders are not equipped with liners and as it is practicable to bore them first, any imperfections in the casting will show up before a large amount of time has been spent in planing operations. The operation of boring a low pressure cylinder is shown in Fig. 11. This work is done on a 16-30-foot convertible boring mill and requires 36 hours. The ends of the cylinder are also faced during this operation. In Fig. 11, the counterbored section has been roughed out and a roughing chip started down the cylinder. The object of boring the cylinders on a vertical mill is to insure them being round when assembled. A cylinder bored on a horizontal boring mill might show up egg-shaped when assembled in a vertical position. Conversely, cylinders for horizontal engines are generally bored on a horizontal boring mill. The boring mill used for this operation is rigid in construction which factor is necessary to avoid chattering. The finishing cut is taken with a wide feed which insures the sides of the cylinder wall being parallel within close limits. Considerable care must be exercised in setting up the casting for the initial operation to make sure that all surfaces requiring machining will clean up, for while the amount allowed on the casting for finishing is liberal, carelessness in handling large castings in setting them up for machining operations would result in some surfaces not finishing out. Thus careful setting is necessary before the cutting tools are brought in operation.

The next operation on the low-pressure cylinder is to plane the seat for the supplementary valve face. These cylinders are supplied with supplementary valve faces to insure economical repairs when the face becomes badly worn through use. It would necessitate dismantling the engine to refinish the valve face if it were made integral with the casting. In the present case, however, all that is necessary is to remove the supplementary face, refinish it and replace it. If the face is too badly worn for refinishing, a new one is readily substituted. The supplementary face is held in place with bronze screws.

The operation of planing the seat is shown in Fig. 9. This work is done on a planer that will take work 13 feet square between the housings. The platen of this planer weighs 50 tons and the reversal is done electrically. It is necessary to plane the seat flat, otherwise the valve seat would require unnecessary scraping to insure a good fit. After all the surfaces that require planing are finished, the next operation is to drill the holes for the steam chest cover and the supplementary valve seat screws. This work is done on a radial drill and is illustrated in Fig. 10. Exact duplication of parts is assured by using drilling jigs. As the illustration shows, a jig is fastened on the upper surface of the casting for locating holes for the steam-chest cover studs while the jig shown in a lower position is for drilling the holes for the supplementary valve seat. The casting is blocked up on the drill base and is squared up by the finished ends. Holes in the lower end of the cylinder are sometimes machined on a horizontal boring mill This is shown at the right in Fig. 12.

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Intermediate cylinders require two boring operations which are done on the vertical boring mill. These are the bores for the cylinder and piston valve. In the case of this cylinder, the planing operations are finished before boring. The high-pressure cylinder also requires two boring operations, one for the cylinder bore and the other for the piston valve. These cylinders are bored to fit chilled iron liners to take the wear. Thus, instead of reboring them when worn, the worn liners are forced out and new ones substituted. The bore for the cylinder is machined on the vertical boring mill but in the case of the piston-valve bore, the work is done on a horizontal boring mill. This is necessary because the limited size of the hole will not permit the entrance of the type of boring bar with which the vertical mill is equipped. The operation of boring the piston valve seat is shown in Fig. 8. The machine used in this case is a special boring mill built for stationary-engine work which carries two boring bars set at 90 degrees.

Cylinder heads and pistons are turned and bored on vertical boring mills. As this is a simple vertical mill turning operation it is prosecuted by methods known to every mechanic. Piston rings are also turned on vertical boring mills as by this means it is an easy matter to turn the outside and bore the inside at one operation, using two boring bars simultaneously. In turning large piston rings by this method, that is, locating them vertically, round rings are assured which might not always be possible if the work were done horizontally. The piston rings are made sufficiently large to allow for making a satisfactory fit after they are split.

The crankshaft of any marine engine is an important member as this unit is the vital connecting medium by which the reciprocating motion of the pistons is conveyed to the propeller shaft. The crankshaft of the engine under discussion is of the built-up type made in two units, bolted together through the medium of coupling flanges. One section carries the high-pressure and intermediate cranks while the other accommodates the low-pressure crank.

The shafts and pins are forged steel while the webs, or cranks as they are sometimes called, are steel castings which are positioned by keys and firmly held in place by being shrunk on over the shafts and pins. As stated before, the pins are cranked at 120 degrees. The couplings are forged integral with the shaft units.

The first step in machining the webs is to surface them accurately

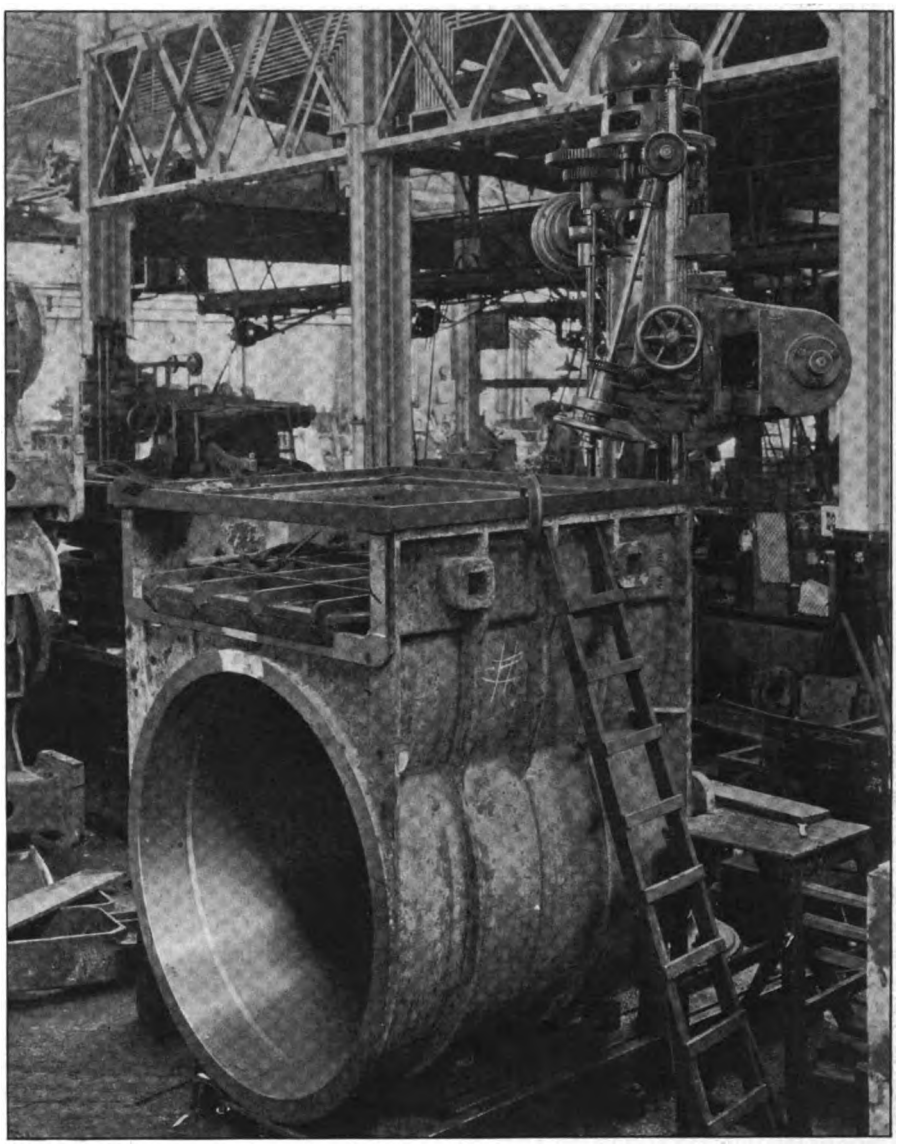

FIG. 10—LARGE DRILLING JIGS INSURE EXACT DUPLICATION OF FINISHED UNITS—IN THIS CASE THE OPERATION IS DRILLING HOLES FOR THE LOW-PRESSURE STEAM CHEST COVER, ON A RADIAL DRILL

for upon the skill with which this operation is carried out depends the accuracy of the finished shaft. It is obvious that the front and back surfaces, or cheeks, must be parallel, as these surfaces are used as locating points in boring the holes for the shafts and pins.

The webs are surfaced on the planer as illustrated in Fig. 7. This tool is equipped with two heads on the cross rail and a side head. The side head, however, is not utilized in this operation. This planer has ample capacity for the work in question as it will clear 60 inches between the housings. Six webs are planed at one operation. They are held in place on the platen by means of special holding fixtures equipped with locating bolts. These bolts are set at an angle which causes them to force the work downward, toward the platen. This insures a flat contact. The holding fixtures are securely bolted to the platen and as they are designed partially to encircle the ends of the webs, the danger of the work "floating away" from its setting, due to the contact of the tool while taking a heavy cut, is eliminated. In Fig. 7, a roughing cut is in progress. The feed is 1/32-inch wide while the depth of cut is 13/16-inch.

The webs are first roughed out on each side after which two finishing cuts are taken, one on either side. Customary methods of measuring large work of this description, such as spring calipers, a scale or surface gage, are not deemed accurate enough for this work. The pieces are calipered with micrometers to make sure that they are parallel within close limits.

The next operation is to bore the holes for the safts and pins. This work is done on a vertical boring mill. Two webs that are to form one crank are positioned together and

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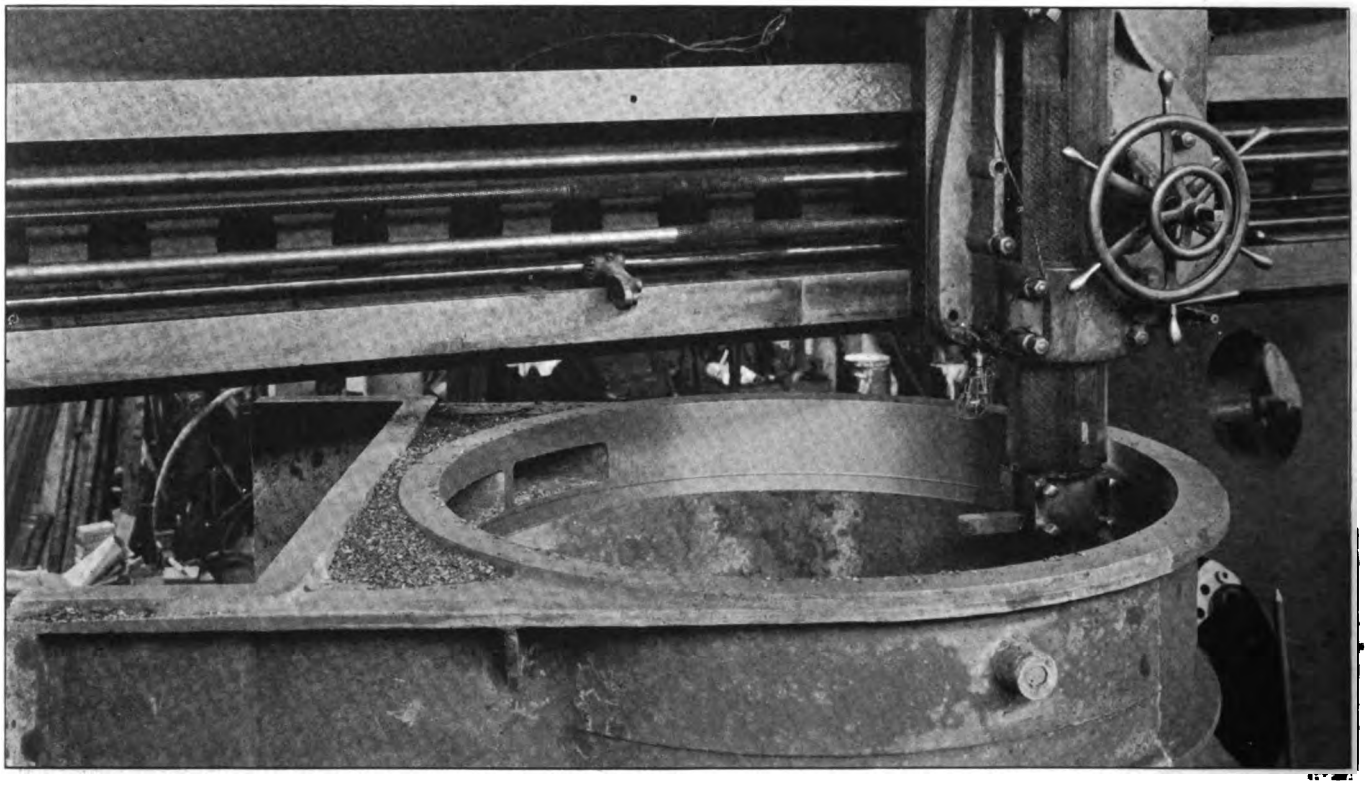

FIG. 11—CYLINDERS ARE BORED ON A VERTICAL BORING MILL TO INSURE THEIR BEING ROUND WHEN IN THE POSITION IN WHICH THEY OPERATE—CYLINDER SHOWN IS A LOW PRESSURE—THE ROUGHING CUT HAS JUST STARTED

bored at one setting. For this reason, the holes will align exactly, a condition necessary in making up a crankshaft that will run true when finished. The holes are accurately sized by means of micrometer gages. This is essential to insure success in the shrinking operation that follows.

Before the two cranks are taken apart, they are keyseated on the slotter to accommodate the key that positions them on the crankshaft. From this, it is clear that the two holes in each crank, as well as the keyseat, will align absolutely as all the work on both cranks was done simultaneously.

The crank pins are accurately turned to size on an engine lathe. The portions that are to be shrunk in the webs are left oversize, the amount

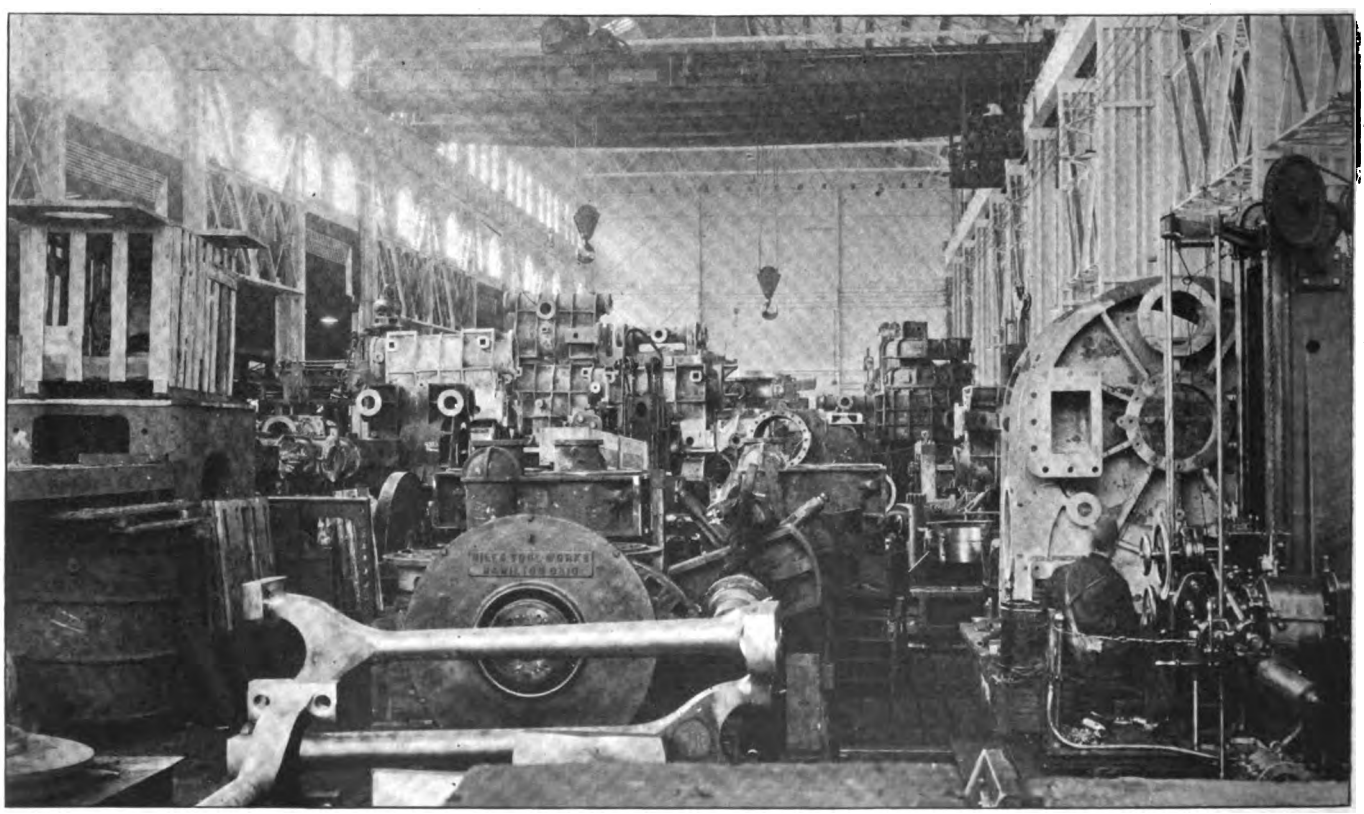

FIG. 12—VIEW IN THE MAIN MACHINE SHOP—THE MACHINE AT THE EXTREME RIGHT IS A HORIZONTAL BORING MILL WORKING ON A LOW PRESSURE CYLINDER

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allowed for shrinking being 0.001-inch for each diametrical inch. Care is exercised to make sure that all three surfaces, that is, the two portions that are to be shrunk in the webs and the center portion that bears in the connecting rod bearings, are parallel. This is especially essential in the case of the center bearing portion for if this is tapered unnecessary scraping in the assembly operation is called for in fitting the bearings. This portion of the pin is also carefully calipered with micrometers to make sure that it is round, otherwise a good fit cannot be made.

In making the shaft sections, they are first roughed out all over on an engine lathe after which the portions that are to be shrunk in the webs are carefully finished, leaving the correct amount of oversize for shrinking. The ends of the couplings are next carefully faced. Next the keyseats to position the cranks and eccentrics are cut. The keyseating is done on a shaper. As the keys are standard sizes, the seats are made slightly undersize to insure a driving fit. The bolt holes in the couplings are next drilled and reamed. This work is generally done on a horizontal boring machine, the holes being located by means of a jig that fits over the coupling.

The next step is to shrink the webs over the shafts and pins. This is an important operation that must be carried out carefully for if a web should stick slightly while being positioned it might contract to the extent of gripping the shaft tightly before it was properly seated. Should this happen, the only remedy would be to cut away the web which, of course, would ruin it and at the same time render valueless its mate with which it was bored and keyseated.

In shrinking, the webs are positioned by means of the assembling fixture illustrated in Fig. 6. This consists of five locating members, fitted with removable caps, to accommodate the shaft sections. These locating members slide on a cast-iron bed plate and are kept in the correct longitudinal position by means of locating blocks which engage a locating slot. The webs are brought up to a black heat in an oil-fired furnace especially designed for this purpose. The heated web is passed over the end of the shaft which is in position in the fixture, after which the crank pin is inserted. Next the other web to form the crank is slipped over the pin and another shaft section inserted. The caps are now firmly fastened in place and the webs allowed to cool which causes them to contract firmly in place. As the illustration shows, the webs are located in the correct position apart through the medium of a box-section spacer placed between them. To insure accurate results, the assembling fixture must be made carefully as otherwise correct alignment is not possible. The webs and shafts are placed in position by means of a traveling crane.

After all the webs are shrunk in place, the next step is to bolt the two sections together at the coupling, after which the shaft is mounted in an engine lathe, as shown in Fig. 13, where the final finishing cut is taken over the shaft. The shaft is located on its centers and driven by the face plate. It is also steadyrested at the coupling. The finishing chip must be taken carefully as upon it depends the true running of the shaft. If carefully carried out, the shaft will run true within close limits. As a matter of fact, the company has made a number of shafts that showed up dead true when tested with a dial indicator.

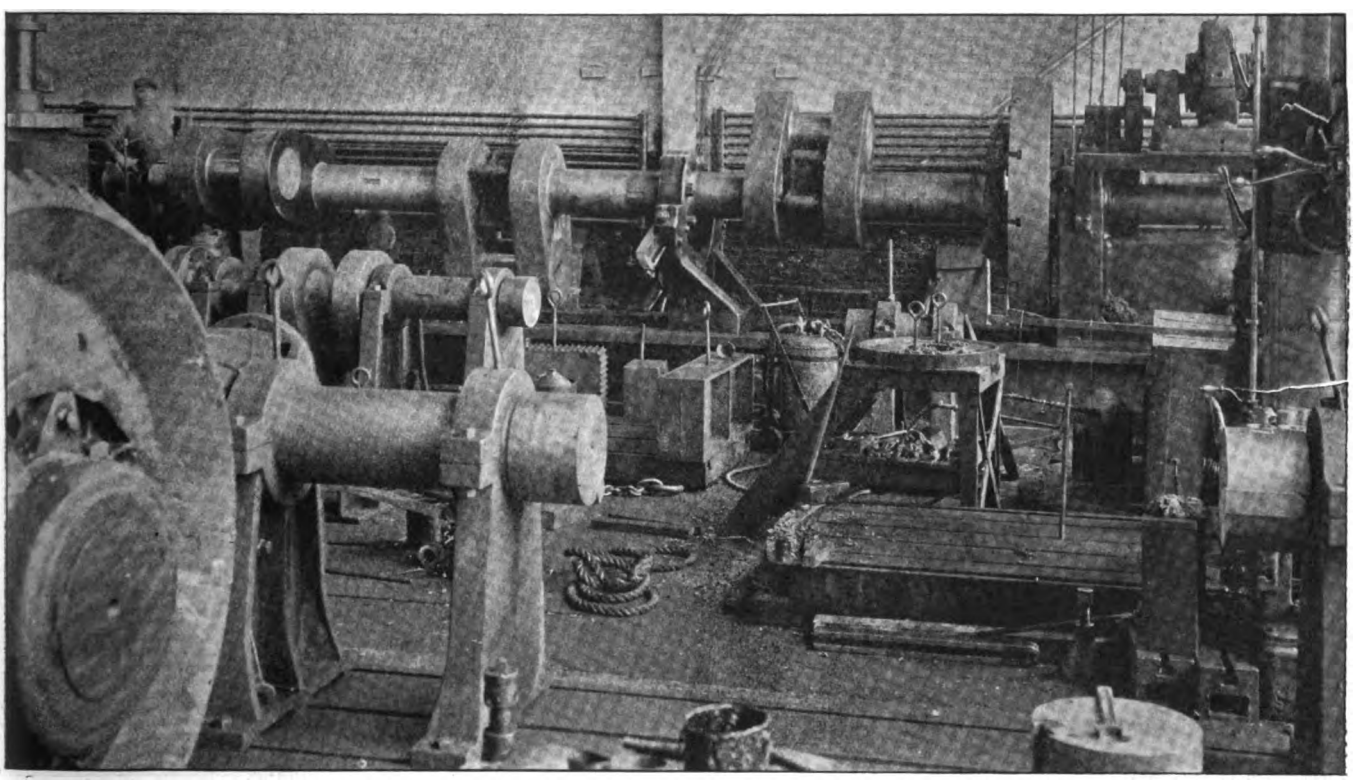

FIG. 13—THE LAST OPERATION ON THE CRANKSHAFT CONSISTS OF TURNING THE STRAIGHT PORTIONS BETWEEN THE WEBS—THIS LATHE IS RUN BACKWARD TO AVOID CHATTER MARKS

In taking the finishing cut, the lathe is generally run backward to avoid chattering. Why this practice eliminates chattering, no engineer has yet been able to explain conclusively. Actual practice, however, proves that it does and for this reason it is often employed in taking finishing cuts on crankshafts.

As the illustration shows, spacers fitted with adjusting screws are placed between the webs to avoid springing the shaft. These must be accurately adjusted for if they are set too tightly the shaft is sprung out of alignment, while if they are too loose the tailstock center compresses the shaft to a certain extent which also results in the shaft being out of alignment.

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The connecting rods are steel hammered forgings. One end is forked to span the crosshead while the other end has a single locating face. The forgings as received have been roughed out all over. This is done at the plant where they are made in order that any imperfections that might exist may readily be discovered.

The first finishing operation is to recenter the rod carefully and to finish turn all the radial portions. This work is done in an engine lathe as shown in Fig. 5. The ends are next faced. It is essential that they be faced true for if they are tapered slightly a good bearing on the wrist and crank-pin boxes cannot be obtained.

The next operation is to plane the flat surfaces at either end to make them conform to the wrist and crank-pin boxes. This work is done on a drawcut shaper as shown in Fig. 4.

This tool is also used in finishing the radial sweep of the forked end. In planing this section of the rod, the machinist feeds the tool downward as it traverses, thus cutting a radius. As his eye is the only judge of the depth of cut to take at each stroke, a high degree of skill is necessary to turn out a workmanlike job. After the planing operations are complete the rod is drilled and reamed to accommodate the bolts that fasten it to its boxes. This work is generally done on a horizontal boring mill, the drills being guided by jigs. After drilling, the unit is carefully finished by polishing with abrasive cloth and oil which removes all tool marks and imparts a good finish.

(To be continued)

New Boston Office

IN order to serve its rapidly growing interests in New England more adequately, The Penton Publishing Co., publisher of THE MARINE REVIEW, *has established a new branch office in Boston. This office is located at 426 Old South building, 294 Washington street.*

This expansion was found advisable in order that the unusually important maritime interests of the New England coast could be more closely served. New England is a center for both wood and steel shipbuilding and the port of Boston is one of the most important on the Atlantic seaboard.

The New England office will be fully organized in both editorial and business departments. The editorial work will be in charge of H. R. Simonds. During the war, Mr. Simonds was captain of Company F, 317th Engineers, attached to the First Army corps, American Expeditionary Force. He also brings to his work a broad engineering training. The business department will continue to be in charge of George D. Macdonald, who as heretofore will make his headquarters in New York.

The Penton Publishing Co., Cleveland, also publishes The Iron Trade Review, the Daily Iron Trade and Metal Market Report, The Foundry and Power Boating, and in addition to the new Boston office maintains branch offices in Chicago, Cincinnati, New York, Philadelphia, Pittsburgh, Washington, D. C., and Birmingham, England.

Many Wood Tugboats Built

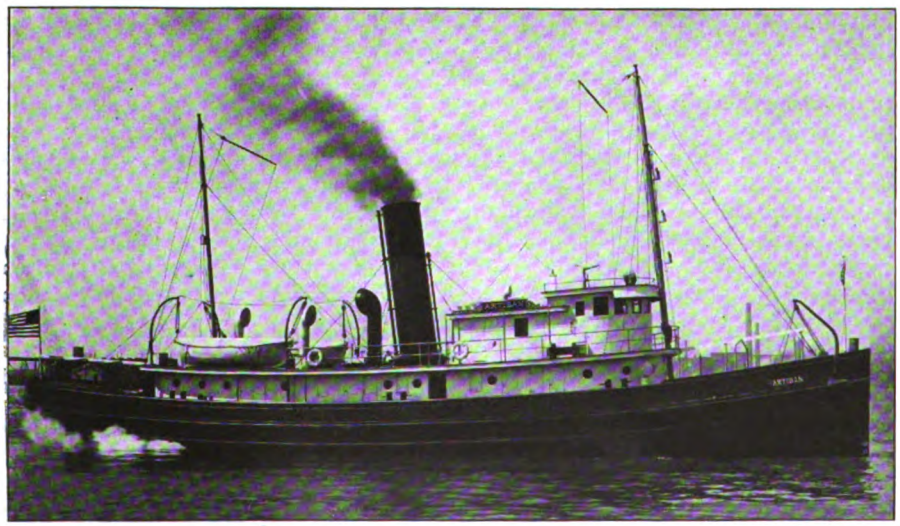
Maryland Shipyard Has Eight Sister Boats Nearing Completion—One Has Made Its Trial Run

TODAY, when the sentiment of the country leans toward steel ship construction, it is interesting to find the wooden tugboat holding its own. The Bethlehem Steel Co., although one of the largest steel manufacturers of the country, has learned that wooden tugs, in certain classes of service for which they are intended, have advantages over those made of steel, in addition to the lower first cost.

The builders of small wooden boats, while not directly affected by the war needs, found a big increase in business due to the greater towage requirements of the steel companies and of the large shipbuilding concerns. One such builder, M. M. Davis & Son, Inc., New York, has had many orders for wooden tugs and now at its Solomons Island, Md., plant, has eight sister ships of that class nearing completion.

One of these, the ARTISAN, is shown in the accompanying illustration. She has a length over all of 133 feet, with a 29-foot beam and a depth of 15 feet. In her recent trial trip, she made over 12 knots an hour.

The keel and keelsons and the stem, frames and center keelson are all of oak construction. The sheathing is yellow pine. The main engine is a triple expansion unit built by the Bay State Iron Works, Erie, Pa. The engine is rated at approximately 1100-horsepower with cylinders 18, 28 and 45 inches bore x 30-inch stroke. The condenser is built integral with the engine and has 1721 square feet of cooling surface.



THE ARTISAN ON ITS TRIAL TRIP MADE OVER 12 KNOTS PER HOUR. SHE IS A MODERN TUGBOAT, 133 FEET LONG, EQUIPPED WITH TRIPLE EXPANSION, 1100-HORSEPOWER ENGINE

The two boilers are of the Scotch type, designed for a working pressure of 185 pounds per square inch and with a heating surface of 1500 square feet each. The shaft is 9⅛ inches in diameter at the thrust and 10¼ inches in diameter in the tail shaft. The propeller is 11 feet 6 inches in diameter and is designed for about 100 revolutions per minute for a tug speed of 12 knots an hour.

The tug is equipped with the usual accessories which include a circulating pump, a donkey pump, a feed and air pump, feed water heater, wrecking pump and electrical generator. She also carries a wireless outfit.

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Norway Has Big Wireless Station

Equipment is Operated on Time Spark System by Hydroelectric Power—Swedish Docking Facilities Are Improved—Launches Composite Ships

THE wireless station at Stavanger, Norway, is worked on the timed spark system. The sparking machine makes 2080 revolutions per minute and produces 1650 sparks per second, having a wave length of 6½ to 10 miles. The sending station is in Hetland, three miles from Stavanger, and the receiving station at Naerland, about 18½ miles from Stavanger, according to O. Moe in *Teknisk Ukeblad.*

The aerial gear of the sending station is supported on 10 tubular steel masts in sections bolted together, 24 insulated antennae wires are suspended between them, each consisting of 3500 feet of silicon bronze wire. The masts are calculated to resist a tension of two tons at the top and, in addition, a wind pressure of 30 pounds per square foot. Each mast is stayed by 24 steel wire guy ropes carried to four equally spaced concrete foundations. The mast itself rests on a steel bedplate 7 feet 6 inches square, 2 inches thick, and held in position by 16 two-inch diameter holding down bolts, 6 feet long. The whole foundation material is built in a hole cut out of rock and made solid with cement. All guy-ropes are insulated and tested to a total tensile strength of 13 tons. A platform of checkered steel plate supported on strong angles is fixed 5 feet below the top of each mast, together with pulley block, etc., for gaining access.

Power is supplied from the Stavanger hydroelectric power station in the Oltedale valley through an overhead transmission line delivering alternating current at a pressure of 5000 volts to a point 3300 feet from the wireless station. A cable with three strands each of 0.038 square inch area continues to a step-down transformer station, which supplies the various requirements of the radio station. Three cables each of 0.97 square inch area conduct the low pressure current to a set of bus bars connected to the main switch board of the station. A special transformer is provided for heating the antenna wires in case they are covered with ice and snow.

The energy for the closed-oscillation circuit is produced by two continuous current dynamos, each of 150 kilowatt, working at a pressure of 5000 volts. They are mounted on a common shaft and driven by a 500-horsepower synchronized 3-phase motor. These generators run in parallel and have a common exciter, also mounted on the same shaft. The current generated passes through bright copper wires mounted on insulators to a battery of electric condensers on the second floor. The sparking machine is placed in a separate room, and an air compressor is provided to send a jet of compressed air, at a pressure of 40 pounds per square inch, against the electrodes of the sparking machine, through a mouthpiece with a narrow slit. Each condenser consists of a number of zinc plates separated by plate glass insulators, all joined together and placed in a stoneware tank filled with oil. A pair of condensers are joined in series, and these again in parallel by copper conductors, which finally unite in broad copper bus bars, one leading to the primary winding of the jigger and the other to the spark gap.

The Morse keys are worked from a small motor generator, which transforms 3-phase current to continuous current at 110 volts. The keys are placed in the high tension circuit and not, as is frequently the case, in the low tension circuit.

The two stations, 19 miles apart so as to enable the duplex system of working to be used, are so situated that their center lines are parallel and point towards the two corresponding stations in America. The receiving station is provided with eight masts 300 feet high, similar in design to those of the transmitting station, and placed in a straight line 984 feet apart. Their antennae consist of two insulated wires each 8500 feet long. In order to prevent the sending station from having any effect on the receiving station in Norway when working on the duplex system, a so-called balancing antenna is placed between them. This consists of a single wire supported from 17 wooden masts 98 feet high, placed 500 feet apart, to form a straight line 8500 feet long perpendicular to the center line of the transmission antennae and at a distance of about 1640 feet from the receiving station, where it terminates in a system of wire netting and a condenser. The receiving station is provided with the latest type Marconi long distance instruments for simplex and duplex working, together with arrangements for the receiving of automatic messages on phonographic rolls.

The power required for working the receiving station is obtained from a hydroelectric station at Jaederon through an underground cable. The current is used for charging a battery of accumulators with 60 cells erected lines in duplicate to the Royal Norwegian telephone station at Naebo in a special building. The receiving station has direct telegraph lines to Christiania, Bergen, and telephone and to the transmission station at Ullenhang.

Improves Swedish Yard

Two drydocks were built in 1896, at Oskarshamn, Sweden, one being 355 feet long and 49 feet wide with 15 feet depth of water on the sill, and a smaller one, 147 feet long, 7 feet 6 inches deep. Both docks have one common entrance, and slipways have been arranged for repairing ships up to 6000 tons deadweight. These are served by a system of electric cranes and winches. Berths for building ships up to 10,000 tons deadweight have been recently arranged. The plate bending slabs in the yard are the largest in Scandinavia.

The works are driven entirely by electricity from the Finsjö hydroelectric power station. The current is transformed at the works. Tools are driven by electricity or compressed air. Steam is only used for heating the works.

A special feature is made of a carefully arranged steam kitchen, built during the war, where meals are served below cost price, the company, in addition, providing food at reduced prices for the families of the workmen. This has proved a great success from every point of view.—*Teknisk Tidskrift.*

Launches Composite Ships

The first Norwegian composite ship has been launched at Larvik. It is built of fir planks over a steel frame, has a carrying capacity of 650 tons and a speed of 9 knots. It is driven by an oil motor and can carry a fuel supply to last 12 days. Another similar ship was launched in March. Denmark has already a composite ship which was built recently at Frederikshavn.

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How to Patch Holes in Stone Ships

A Wooden Caisson Was Built Over the Hole to Afford Dry Working Conditions and Four Applications of Cement Applied

By C. D. C. Wilson

DURING a heavy northeast wind which kicked up considerable sea in the slip of the Liberty Shipbuilding & Transportation Co.'s shipyard at Cleveland, a hole was stove in the port side of a reinforced concrete car float, built for the embarkation service, war department, which had been launched a few days previously. The hole, located just below the lower strake of the wood fender and about 53 feet from the stern of the boat, was entirely below the waterline. It was caused by the parting of a breast mooring line, allowing the car float to surge against a wooden raft moored between it and another concrete car float. The raft was constructed of 12-inch pile butts with a 2-inch plank deck. One of the pile butts extended beyond the ends of the others, and it was this projecting end which punched through the skin of the ferroconcrete car float when the latter was thrown against it with terrific force. The deadweight of these car floats is about 1500 tons, so it is not difficult to imagine the impact developed which would doubtless have punctured either a wood or steel craft.

The compartment in which the hole was located soon filled with water which listed the float about 4 degrees to port. There was no danger of the craft sinking as these car floats are provided with watertight bulkheads.

After studying the situation it was decided first to locate the hole accurately and determine the extent of damage to the surrounding concrete. With this in mind, the outboard compartments on the starboard side and forward of the compartment in which the hole was located were filled with water. An additional weight of 30 tons of rail was also placed on the deck at the starboard bow. This listed the boat about 12 degrees to starboard and brought the hole above water. That is, the bottom of the hole was just awash, as shown in Fig. 4. A thorough examination of the puncture and the surrounding concrete was made and it was found that the break was in the 3½-inch reinforced concrete skin between frames 38 and 39. At the center of the hole, the reinforcing rods were bent out of line about ½-inch.

The hole was about 3 feet long and 18 inches wide. The concrete skin was shattered and cracked for a radius of about 2 feet surrounding the hole, but no damage was done to the concrete frames or side beams.

It was evident that in order to cut away the damaged concrete and patch the hole, protection from the rolling of the boat and consequent wash of the seas had to be taken into consideration. To provide for this condition a timber caisson was built as shown in Fig. 2, and lowered into position over the hole. All seams were caulked and holding-down bolts drawn tight, after which the cofferdam was pumped dry with a 3-inch steam syphon. A comparatively dry working chamber or caisson was thus provided and repairs to the hole were started. The cofferdam is shown in Fig. 1 which also shows a 4-inch centrifugal pump. This was set up for emergency use in case of failure of the syphon to keep the cofferdam dry.

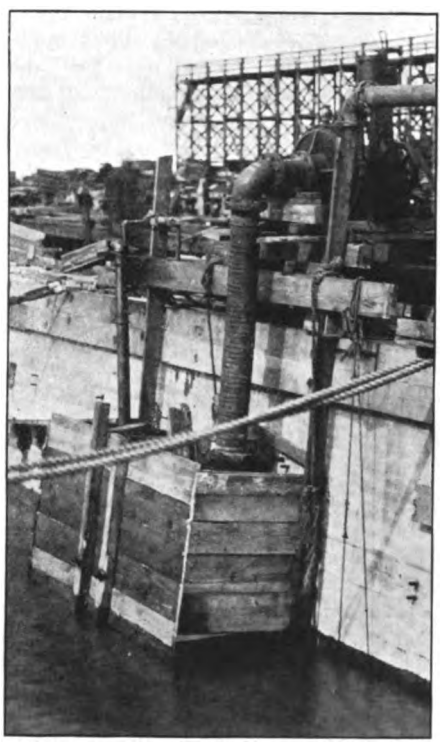

FIG. 1—CAISSON IN PLACE AT THE SIDE OF THE BARGE

The area of the patch after all cutting out was done, assumed the shape shown in Fig. 4. Additional vertical steel was threaded in between the horizontal reinforcement in order to provide a closer mesh for the binding of the concrete. A wooden form was put in place on the outboard side of hole, and after thoroughly cleaning all contact surfaces with compressed air and water, a concrete patch was put on by the gun method, using a mixture of the same proportions as was used in fabricating the rest of the boat. Four applications were necessary to complete the patch. This was due to the rolling of the boat which prevented a heavy application at one time. It required four days from the date of puncture to complete the patching.

The outside form was removed two days after concreting was finished and two coats of waterproofing material composed of magnesium fluo-silicate were brushed on the outside of the patch. This same mixture had been applied to the entire hull and deck of this car float before launching. One week after repairs were completed the boat was brought to an even keel by pumping out the water in the starboard compartments. Water pressure was kept from the patch, however, by pumping out the cofferdam until the concrete was two weeks old. The cofferdam was then removed and the wooden rubbing strip, which had been taken off to allow the placing of the cofferdam, was reset. No seepage of water has taken place around the edges of the patch, and there is no leakage through the patch.

This is believed to be the first attempt to patch a concrete hull where the damaged section has been below the water line and the company is confident that regardless of the location of the hole, it can be expeditiously and economically repaired. Engineers of this concrete yard state that such repairs can be made with less delay and expense than with a steel or wood hull. To illustrate. Let it be assumed that this hole had been stove in the bottom instead of the side of the car float. The particular compartment in which the puncture occurred would have filled with water, the bulkheads confining it to one compartment. Thus the craft would have still remained

The method described in this article was devised by the author, an engineer connected with the Liberty Ship Building & Transportation Co., Cleveland. The repairs were carried out under his supervision.

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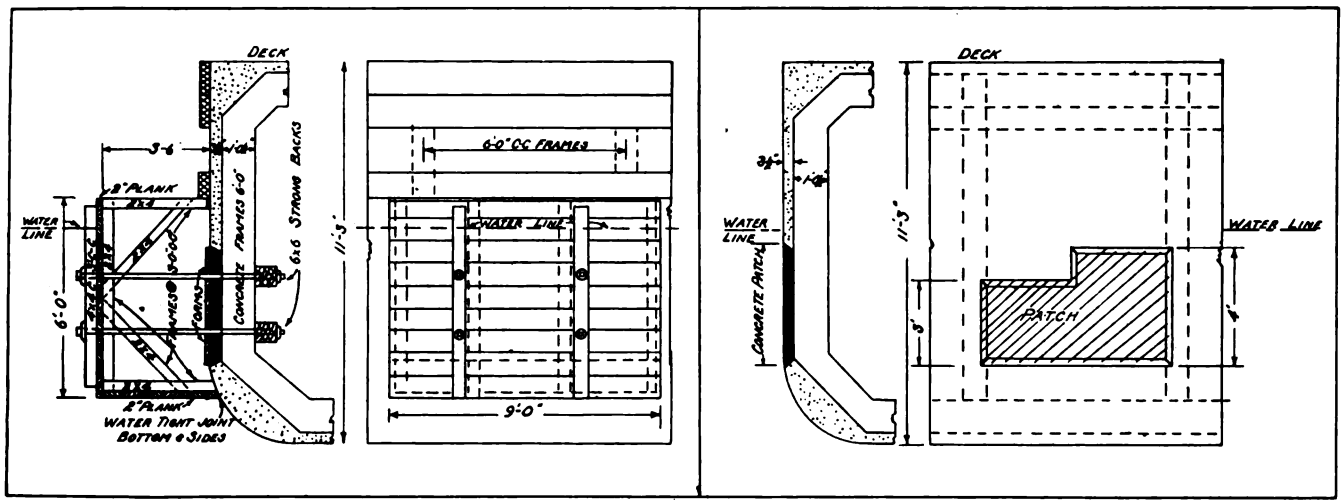

CROSS SECTION OF TIMBER CAISSON DETAILS IS ILLUSTRATED IN FIG. 2 WHILE FIG. 3 SHOWS THE SHAPE AND DIMENSIONS OF THE PATCH

afloat. A diver would have located the hole and thoroughly examined it and a timber air chamber or pontoon could have been lowered into position over the outside of the hole and a watertight connection made to the bottom. It would have then been possible to pump out the compartment and apply a concrete patch in much the same manner as described.

A puncture through the plates of a steel hull usually damages the rivets throughout a large surrounding area and in many cases damages the adjacent frames. The same condition is true of a wood hull. A very careful investigation of the concrete side beams of this car float failed to reveal a single crack or other damage and proved beyond a doubt that the damage was confined to the reinforced concrete skin.

The reinforced concrete car float repaired is one of six now being built by the Liberty Shipbuilding & Transportation Co. for the embarkation service, war department. Two of these floats, each of 1500 tons displacement, have been launched and are now ready for delivery. The remaining four will be turned over to the war department before Aug. 1.

Changes Firm Name

The Gas Engine & Power Co. & Charles L. Seabury & Co, Consolidated, Morris Heights, N. Y., has changed its name to the Consolidated Shipbuilding Corp. The company has been in business for over 35 years during which time it has launched more than 3000 craft of various types.

In 1885, the company under the name of the Gas Engine & Power Co., was founded by Clement Gould and F. W. Ofeldt. The company engaged in building naphtha launches, the engine being an invention of Mr. Ofeldt. It derived its power through the expansion of naphtha gas on pistons much after the principle of a steam engine. These engines were equipped to condense the vapor and to use it over again. In the late eighties, naphtha launches were a popular form of pleasure craft.

During the latter part of 1894, the company began to build electric launches for the Elco Co., Bayonne, N. J. The two companies worked together producing this type of craft for about six years.

In 1896, the company purchased the stock of Charles L. Seabury & Co.,

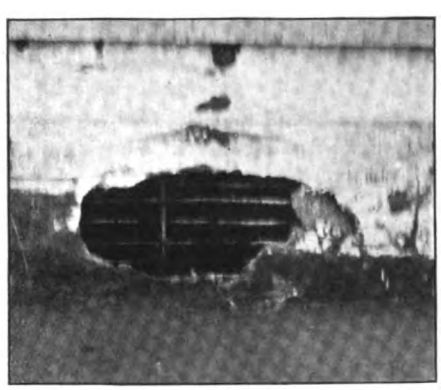

FIG. 4—HOLE READY FOR PATCHING

the consolidation of the two companies being known as the Gas Engine & Power Co. & Charles L. Seabury & Co., Consolidated. The Seabury company had been organized in 1889 to build yachts, engines and boilers.

The company continued to build launches, yachts and propelling equipment and also built one of the first torpedo boat destroyers for the United States navy, the BAILEY, for several years the fastest boat in the navy. The company also built two other craft of this type for the government, the STEWART and the WILKES.

The company subsequently took several government contracts for steam launches, life boats, engines and boilers. It also built the gunboats DUBUQUE and PADUCAH. Later the company began the construction of marine type internal combustion engines. The company has also built many speedy powerboats and famous yachts, among which are the KANAWHA, VITESSE, VIXEN, NIAGARA IV and the HELENITA.

When the war broke out the company immediately turned its attention to government work. It converted several yachts and other craft for government work and also built five 1000-ton steel ocean-going mine sweepers, 175 flying boat hulls and nine tugboats.

The company is now reverting to peace time pursuits. It has a well equipped plant and yard for the construction of smaller type vessels. It has now under construction steel steam yachts, steel and wooden tugs, gasoline yachts, power boats, yacht tenders, steam and gasoline engines, boilers and other equipment.

The officers of the company are: John J. Amory, president; William J. Parslow, vice president; Bruce Scrimgeour, secretary and general manager and Clement G. Amory, treasurer. Joseph S. Potter is superintendent, J. M. Forhenbach assistant superintendent, Albert Christen mechanical superintendent, H. W. Patterson chief constructor. H. E. Fromme chief engineer, and J. E. Lowery head boat builder.

A record for the government-operated barge line on the Mississippi river was made late in April when the towboat OSCAR BARRETT, towing three barges, loaded to capacity, made the trip from St. Louis to New Orleans in five days. Two of the barges carried wheat for export and one carried miscellaneous merchandise for New Orleans. Total amount of export wheat shipped over this waterway to New Orleans in the last three months of 1918 was 9000 tons.

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Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

ALFRED J. BALL was recently appointed traffic control manager of the United States railroad administration for the port of Philadelphia. Mr. Ball's offices are in the Broad street station. He was formerly foreign freight agent of the Pennsylvania railroad and a member of the freight traffic committee, north Atlantic ports, during the committee's existence.

ALFRED J. BALL

Mr. Ball was born in Philadelphia, July 22, 1882.

* * *

CHARLES W. UNBEHAUN has been appointed branch manager of eastern New York and Connecticut territories for the Black & Decker Mfg. Co., Baltimore. He was formerly connected with the Bailey-Drake Co., Chicago. The Black & Decker Co. manufactures portable electric drills, electric air compressors, electric valve grinders, etc.

* * *

I. FELTENSTEIN has been appointed manager of the recently opened Guatemala branch of the Pan-American Exporters, Inc., New Orleans. Stock to the value of $100,000 has been shipped to the new branch house.

* * *

J. W. SANDERS, of the J. W. Sanders Co., New York, has associated himself with W. BENTON KELLER, formerly sales manager of the Pennsylvania Seaboard Steel Corp. A sales company under the name of Sanders, Keller & Co. has been formed with offices at 30 Church street, New York, and in the Crozer building, Philadelphia. The company, aside from representing several steel mills, will act as selling agents for the Allison stockless anchor.

* * *

WILLIAM A. HALL has been appointed president and general manager of the C. M. Lane Life Boat Co., Brooklyn, N. Y., and E. A. NELSON, formerly secretary of the company, has been appointed treasurer. Both men have been members of the firm for many years. N. EWING, the company's technical representative, has recently become a member of the firm and has been elected to the office of secretary. Mr. Ewing is a practical seaman and for a number of years served as first officer at sea.

* * *

FRANK R. FARNHAM has joined the organization of Rex W. Wadman, Inc., New York, technical advertising, as vice president. Formerly Mr. Farnham was sales and advertising counsel of Hollister White & Co., New York.

* * *

R. E. MCMATH has been elected secretary of the Bethlehem Steel Co. and the Bethlehem Shipbuilding Corp., Ltd. He formerly was assistant secretary of these companies and succeeds the late Barry H. Jones.

* * *

A. D. STEBBINS has been elected president and general manager of the Merchants & Miners Transportation Co., Baltimore. Mr. Stebbins has spent practically his entire business life in the employ of the Merchants & Miners company. He entered its service in 1888 at the Norfolk, Va., agency and in 1890 was transferred to the general office at Baltimore. In 1893 he was appointed assistant treasurer and in 1895 he took up the duties of assistant traffic manager. He was made general manager of the company in 1899 and in 1907 he was advanced to the position of vice president and general manager. He retired from the service of the company in 1912 to enter private business which he followed until recently elected to the position he now holds. He succeeds J. H. JENKINS who has retired to enter business for himself.

* * *

LIEUT. COM. H. J. ELSON, United States naval reserve force, has been released to inactive status and has resumed his duties as secretary and treasurer of the Walter A. Zelnicker Supply Co., St. Louis. He has direct charge of the company's internal management and

CAPT. JOHN F. BLAIN
Northern Pacific district manager for the Emergency Fleet corporation during the war who recently resigned

manufacturing operations. He graduated from the United States naval academy in 1898 and after service in Cuba, the Philippines and China, he resigned from the navy in 1902 to become interested in the Zelnicker company. He was chief engineer of the Missouri naval militia with which organization he was mobilized into federal service when war was declared on Germany.

* * *

G. E. TIBBETTS has been appointed general manager of the York River Ship Building Corp., West Point, Va. Formerly he was assistant to the general manager. He fills the place made vacant by the death of R. L. Newman. Mr. Tibbetts is a well known bridge man and has handled a number of large construction jobs.

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Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

J. L. ACKERSON, naval constructor, U. S. N., has been appointed to succeed CHARLES PIEZ as director general of the Emergency Fleet corporation. Mr. Ackerson was formerly a vice president of the corporation. Mr. Piez presented his resignation several months ago, effective May 1, in order to return to private business interests. Mr. Ackerson is a practical shipbuilder.

CAPT. W. A. MAGEE

Successor of Captain Blain as Northern Pacific district manager of the Emergency Fleet corporation who has also resigned

He was born in Michigan in 1881. He graduated from the Michigan Naval academy in 1901 and after serving two years at sea as a midshipman, he was selected for the naval construction corps and was sent to the Massachusetts Institute of Technology to take a post-graduate course in naval architecture. Later he served for two years in the design branch of the bureau of construction and repair. In August, 1917, he was assigned to duty as aide to Admiral Capps when he joined the Fleet corporation as general manager. When Admiral Capps resigned, Mr. Ackerson remained as aide to Mr. Piez. Later he was appointed assistant to Director General Charles M. Schwab.

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EDWARD F. CARRY has been appointed chairman of an organization to be known as the Texas City port commission, Texas City, Tex. The organization will co-operate with the port and harbor facilities commission of the shipping board of which Mr. Carry is chairman, to improve the port's shipping facilities.

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B. B. TEAKLE has been appointed to take charge of the Philadelphia office of the France-Canada Steamship Corp., which was recently opened. Mr. Teakle formerly had charge of the company's Boston office. The Philadelphia office is located in the Bourse and will provide frequent sailings to Italy, France, South America and South Africa. The company owns and operates one of the largest schooner fleets in the world and several large steamships.

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CAPT. F. W. CULLUM, a former master of the Blue Funnel line, Liverpool, has joined the organization of CAPT. JOHN F. BLAIN, Pacific coast agent of the Steward Davit & Equipment Corp., Seattle. Captain Cullum will serve in the capacity of marine surveyor. He recently was located in Tacoma, Wash., where he served as fleet inspector for the Emergency Fleet corporation. EDWARD C. WHITMAN, formerly chief engineer of the steamships VICTORIA and ALASKA of the Alaska Steamship Co., has also joined Captain Blain's organization in the capacity of engineer expert. During the war, he served as machinery and hull inspector for the Fleet corporation at various Pacific coast shipyards.

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JOSEPH DILLMAN has been appointed comptroller of the St. Johns River Shipyard, South Jacksonville, Fla. He succeeds J. J. CONROY who has severed his connection with the company. Other newly appointed officers are: F. H. ROYER, auditor and ROBERT RUSSELL, superintendent. Mr. Russell was formerly superintendent of the J. M. Murdock shipyard at Jacksonville, Fla.

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CAPT. O. A. JOHANSEN was recently elected president of the Shipmasters' association of the United States with headquarters at Seattle. Other officers elected are: CAPT. FRANK WORTH, first vice president; CAPT. C. J. BRUGUIERE, second vice president; CAPT. J. G. NORD, third vice president; CAPT. EDWARD HICKMAN, fourth vice president, and W. T. ISTED, secretary and treasurer.

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J. A. WELLS has been appointed director of the American Foreign Service Corp., New York. The corporation is newly formed and will engage in insurance, shipping and foreign freight forwarding. For many years previously,

J. L. ACKERSON, U. S. N.

Mr. Wells was head of the Wells Shipping Co. He disposed of his interest in that concern before taking up his present duties.

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INMAN H. PAYNE was recently elected vice president of the Cosmopolitan Shipping Co., New York, at the company's annual meeting. Mr. Payne has been traffic manager of the company for several years. Last year he served with the shipping control committee.

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F. C. WILLIAMS, formerly with the division of operations, United States shipping board, New York, has been appointed superintendent engineer for the Cosmopolitan Shipping Co. For 12 years prior to taking up shipping board service, Mr. Williams was with the United States steamboat inspection service, New York.

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How Navy Has Built Up Huge Fleet to Bring Back War Veterans

By V. G. Iden

First authentic story of what government did to equip fleet of transports and supply ships

How Merchant Ships Have Been Changed to Carry the Thousands of Troops Homeward Bound

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DOUGHBOYS OF THE RAINBOW DIVISION TAKING LIFE EASY WHILE HOMEWARD BOUND ON THE LEVIATHAN

WITH the armistice signed and peace approaching, there has been more or less curiosity as to why more vessels have not been returned to their owners. It requires but a brief study to determine the answer. The first of May found approximately 1,000,000 soldiers still in France and the terms of peace not ratified. In addition, the United States had assumed the duty of shipping 1,000,000 tons of foodstuffs to the allies and neutrals. Then came the demand for provisioning Russia. To bring the troops back will keep all available passenger ships in service for the remainder of the present calendar year and perhaps for a longer period. So long as any American troops remain in Europe, provisions must be freighted to them and until Europe has had an opportunity to plant and harvest a crop under peace conditions, our food will be required by its inhabitants.

A complete record of what was done with the merchant ships during the war, and since, would fill many volumes. A brief account of the size of this fleet, which was operated under navy control, would be a notable disclosure which the censorship during the war prevented. At the outbreak of war the United States was without a transport fleet and without a merchant marine capable of furnishone. The army had a few transports of small carrying capacity but their speed was too slow to render them suitable for transatlantic work through the submarine zone. With the exception of the HENDERSON and the HANCOCK, the navy was also without suitable transports. All available American passenger ships were pressed into transport service. The seized German vessels were repaired and used. And as rapidly as troops were sent over, a fleet of freighters was built up to supplement the service. Today the merchant fleet operated by the navy is the largest in the world under any single head. The navy's merchant fleet, however, is divided into two services. One is the cruiser and transport service, concerned with troop movement,

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while the other is the naval overseas transportation service, concerned with freight shipments exclusively.

The cruisers assigned to escort the transports during the war included the ALBANY, BALTIMORE, CHARLESTON, CHATTANOOGA, CLEVELAND, COLUMBIA, DENVER, DES MOINES, FREDERICK, GALVESTON, HANCOCK, HUNTINGTON, MINNEAPOLIS, MONTANA, NEW ORLEANS, NORTH CAROLINA, OLYMPIA, PUEBLO (formerly the COLORADO), ROCHESTER, SEATTLE, SIALA, SOUTH DAKOTA, ST. LOUIS, and TACOMA. Since the armistice was signed, most of these have been retired from the service. The CHARLESTON, FREDERICK, HUNTINGTON, MONTANA, NORTH CAROLINA, PUEBLO, SEATTLE, SOUTH DAKOTA, and ST. LOUIS are still being used but as troop transports. The battleships CONNECTICUT, GEORGIA, KANSAS, LOUISIANA, MICHIGAN, MINNESOTA, MISSOURI, NEBRASKA, NEW HAMPSHIRE, NEW JERSEY, OHIO, RHODE ISLAND, SOUTH CAROLINA, VERMONT, and VIRGINIA have also been drafted in as transports to bring troops home.

Therefore the navy has played an important part in the transport service other than merely offering protection to the troop ships. The first vessels used in this service left New York under convoy on June 14, 1917. The TENADORES, SARATOGA, HAVANA, PASTORES, MOMUS, LENAPE, ANTILLES, MALLORY, FINLAND, and SAN JACINTO were chartered by the war department and turned over to the navy transport service. The naval transports HENDERSON and HANCOCK were also assigned. The freighters CYCLOPS, DAKOTAN, KANAWHA, MONTANAN, D. N. LUCKENBACH, and EL OCCIDENTE were likewise procured. The number of passenger and freight vessels available for service were extremely limited and it was necessary to go out in the market and requisition sufficient tonnage. At one time the navy had under its control over 1000 such vessels, but their number was gradually sifted.

German Ships Formed Nucleus

The nucleus of the transport service was the seized German ships. Among these ships, which are now being operated by the navy as transports, are the AEOLUS (GROSSER KURFURST), AGAMEMNON (KAISER WILHELM II), AMERICA (AMERIKA), ANTIGONE (NECKAR), DEKALB (PRINZ EITEL FREDERICH), FREEDOM (WITTEKIND), HURON (FREDERICH DER GROSSE), LEVIATHAN (VATERLAND), NEDERLANDED (KOENIGEN DER NEDERLANDED), POCAHONTAS (PRINZESS IRENE), PRINCESS MATOIKA (PRINZESS ALICE), SUSQUEHANNA (RHEIN), VON STEUBEN (KRONPRINZ WILHELM), MADAWASKA (KOENIG WILHELM II), MERCURY (BARBAROSSA), MT. VERNON (KRONPRINZESSEN CECILIE), POWHATAN (HAMBURG), and the GEORGE WASHINGTON, MARTHA WASHINGTON and the PRESIDENT GRANT, whose German names remained unchanged. With these ships the transport service possessed some of the best passenger liners afloat.

The shipping board turned over many of the vessels which came into its possession and these were rapidly fitted out as transports. Among the shipping board vessels assigned to this service are the ARMENIA, 10 knots, 7600 tons; ARCADIA, 9½ knots, 7100 tons; ARTEMIS, 13 knots, 11,500 tons; BLACK ARROW, 12½ knots, 8000 tons; LANCASTER, 10½ knots, 11,250 tons; LIBERATOR, 10½ knots, 11,713 tons; MONTPELIER, 11 knots, 10,000 tons; NANSEMOND, 13½ knots, 14,700 tons; NEPONSET, 10½ knots, 11,437 tons; ORION, 13 knots, 5800 tons; ORIZABA, 17 knots, 4400 tons; OTSEGO, 12½ knots, 6470 tons; PHILIPPINES, 12 knots, 13,000 tons; RADNOW, 10½ knots, 11,250 tons; SANTA TERESA, 13 knots, 4250 tons; SIBONEY, 17 knots, 4400 tons; and the SUWANEE, 12 knots, 11,250 tons. The NEPONSET has since been returned.

Thirteen vessels belonging to the American-Hawaiian line have been taken over and converted into transports. This line lost five vessels during the war and has sold seven of its prewar fleet. Therefore, only three of the fleet are to be returned at present. This is inadequate to re-establish the Hawaiian service so that the line has chartered them in the South American trade. The line sold the GEORGIAN, HONOLULIAN, ISTHMIAN, ARBOREAN, ORTISAN, NEVADAN and the NEBRASKAN. The latter two were sold to the Garland Steamship Co., whereas the other five were sold to Norwegians. The MISSOURIAN was lost on April 4, 1917; the KANSAS on July 9, 1917; and the COLUMBIAN on Nov. 8, 1916. While under requisition to the government, the CALIFORNIAN was mined on June 22, 1918, and the MONTANAN was submarined on Aug. 15, 1918. The last ship of this line to sail from New York to the Pacific was on Feb. 15, 1916. The MEXICAN and the COLUMBIAN were permitted to run in the Pacific sugar trade until the fall of 1918.

The American-Hawaiian line has contributed much to the prosecution of the war and is contributing still more to the restoration of peace by turning over 13 of its remaining fleet of 16 ships to the transport service, where they will be engaged until the end of the present year. All of these 13 ships were

FITTING STANDEE BERTHS FOR THE ACCOMMODATION OF TROOPS ON THE KAISERIN AUGUSTA VICTORIA

freighters, but the navy has converted them into troop ships. Among these are the ALASKAN, 10 knots, 14,118 deadweight tons; ARIZONIAN, 10 knots, 14,183 tons; DAKOTAN, 12 knots, 10,200 tons; IOWAN, 12 knots, 9920 tons; KENTUCKIAN, 11 knots, 9945 tons; FLORIDIAN, 12 knots, 10,315 tons; MEXICAN, 11 knots, 9920 tons; SCRANTON (PENNSYLVANIAN), 12 knots, 9920 tons; TEXAN, 11½ knots, 13,886 tons; VIRGINIAN, 11½ knots, 11,207 tons; and the PAYSANDU, formerly the BAIII.

Seven of the larger and the newer of the Luckenbach steamers were taken. These were also freighters, ranging between 12,000 and 13,000 deadweight tons measurement. They included the EDGAR F. LUCKENBACH, EDWARD LUCKENBACH, F. J. LUCKENBACH, JULIA LUCKENBACH, KATRINA LUCKENBACH, K. I. LUCKENBACH, and the WALTER A. LUCKENBACH. The International Mercantile Marine has

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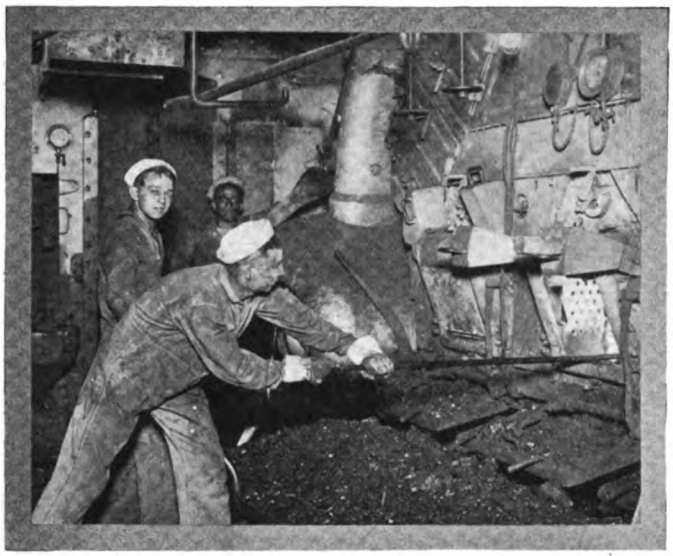
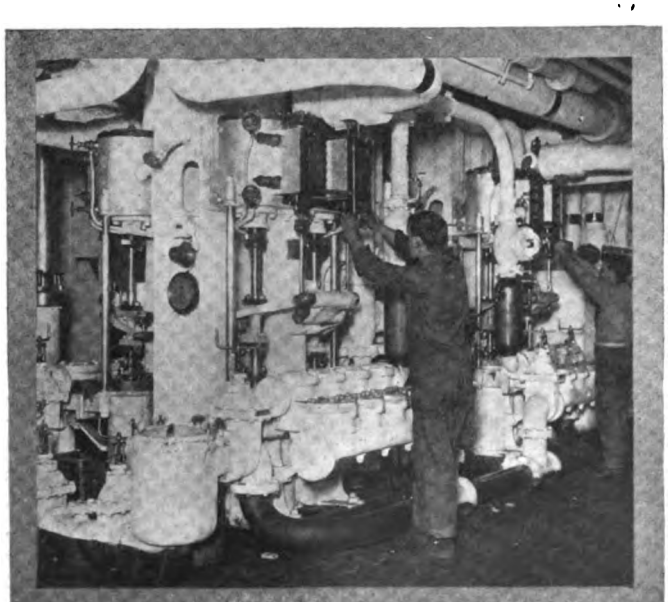


The Leviathan's boilers and engines, like those of other German liners in American ports, were found to be badly damaged when Uncle Sam took her over

But German vandalism reckoned without Yankee ingenuity by which the ship's equipment was put in order so that thousands of doughboys might be carried

From stokers to engineers, this all-American crew of the former Vaterland played an important part in "putting it over" on "Deutschland uber alles"

The Leviathan, which in 1914 was classed as the largest and most luxurious ship afloat, is equipped with berths for maximum transport service



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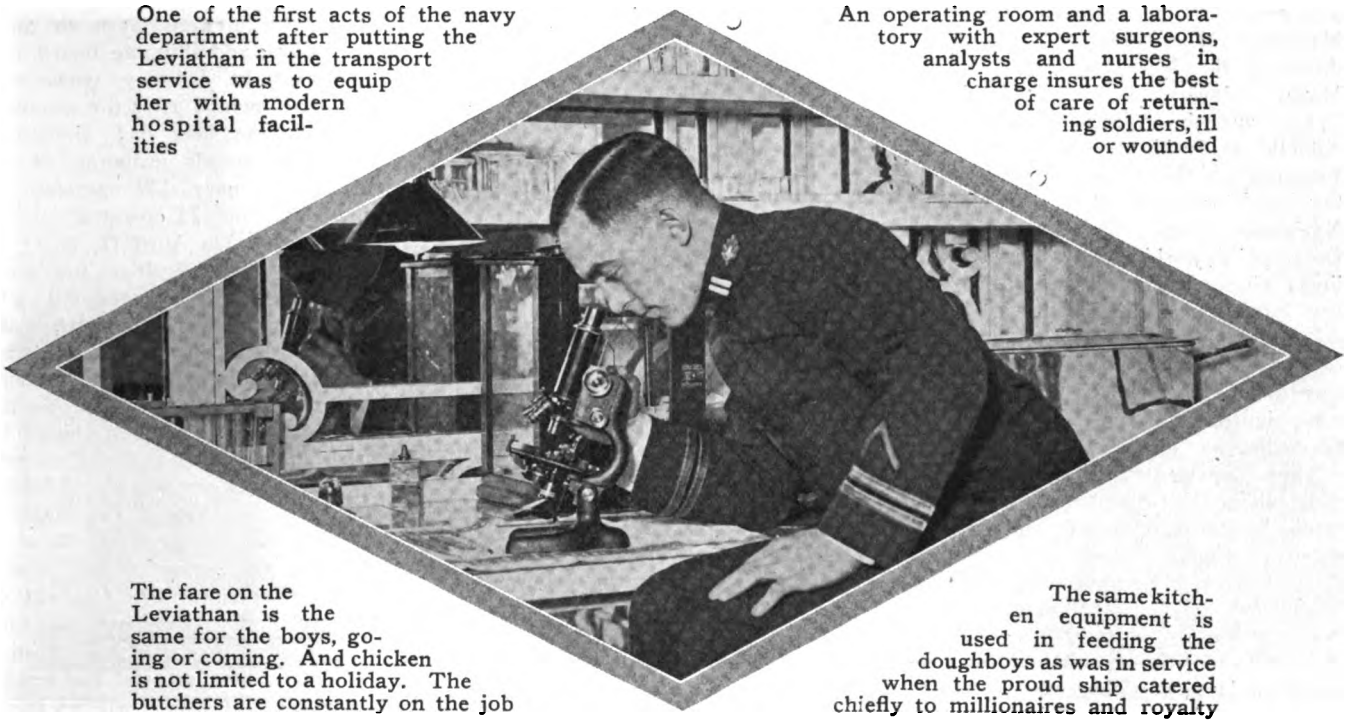
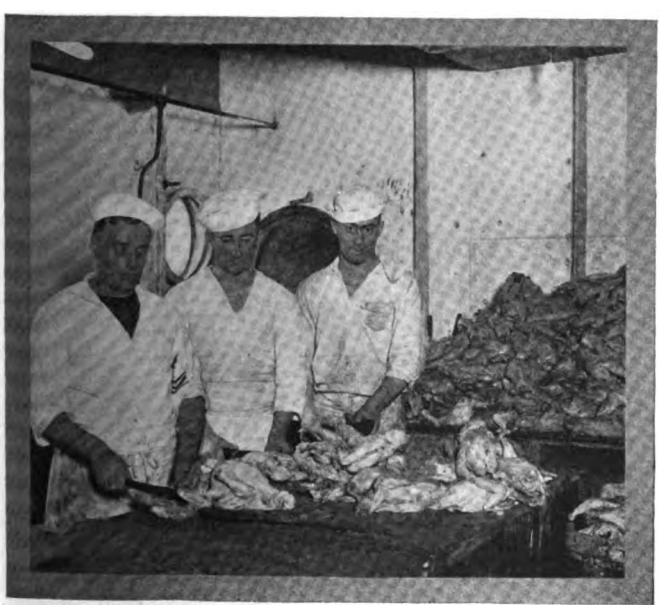
One of the first acts of the navy department after putting the Leviathan in the transport service was to equip her with modern hospital facilities

An operating room and a laboratory with expert surgeons, analysts and nurses in charge insures the best of care of returning soldiers, ill or wounded



The fare on the Leviathan is the same for the boys, going or coming. And chicken is not limited to a holiday. The butchers are constantly on the job

The same kitchen equipment is used in feeding the doughboys as was in service when the proud ship catered chiefly to millionaires and royalty



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contributed the HARRISBURG (PHILADELPHIA), KROONLAND, LOUISVILLE (ST. LOUIS), PLATTSBURG (NEW YORK), and the FINLAND. The ST. PAUL has been returned to this line. The Atlantic Transport Co. has contributed the MANCHURIA, MONGOLIA, and the TROY (MINNESOTA). The Grace Steamship Co. contributed the SANTA ANA, SANTA BARBARA, SANTA PAULA and the SANTA ROSA, out of its fleet of 13 steamers.

Several of the better steamers were taken out of the coasting trade and converted into troopers. Among these were the COMFORT (HAVANA) and the MERCY (SARATOGA), of the Ward line; ANCON and GEN. W. C. GORGAS of the Panama Railroad Co.; the CALAMARES and the PASTORES of the United Fruit Co.; the HOUSATONIC (EL RIO) and the ROANOKE (EL DIA) of the Southern Pacific Co.; the MALLORY (H. R. MALLORY) of the Mallory line; the MARSONIA, MAUI and the WILHELMINA, three of the largest steamers of the Matson Navigation Co.; the SANTA CLARA, and the SANTA OLIVIA of the Atlantic & Pacific Steamship Co.; the PEERLESS of the Standard Transportation Co.; the SHOSHONE of the Shoshone Navigation Corp.; the SIERRA of the Oceanic Steamship Co.; the Pacific liners, GREAT NORTHERN and the NORTHERN PACIFIC, and the SANTA CECILIA of the Nafra Co., Inc. The PENNSYLVANIA of the Texas Steamship Co. was returned to her owners after the armistice was signed, and the LENAPE of the Clyde line has also been returned.

Three transports built by the Sun Shipbuilding Co, Chester, Pa., have recently been turned over to the transport service. These vessels were built for the Emergency Fleet corporation. They are named the MARCIA, EDDEYN, and SOL NAVIS. They are each 10,000 tons deadweight, have twin screws and turbines, being oil burners. They are capable of making 13½ knots. Their length is 499 feet, beam, molded, 60 feet, and depth, molded, 40 feet 11 inches.

Secure Enemy Ships

In addition, the transport service expects to obtain 25 German and Austrian vessels which were interned in German and Austrian harbors during the war. Twelve of these have already been designated and the navy sent officers abroad to take charge of them. They are the GRAF WALDERSEE, PATRICIA, PRETORIA, KATRIEN, CLEVELAND, KAISERIN AUGUSTAN VICTORIA, CAP COLONIA, CAP FINESTERIA, and the big IMPERATOR. The other two are Austrian vessels, the BELLEDOERE ARGENTISIS, and the PRESIDENT WILSON.

The transport HENDERSON was signed over, and the transport service obtained the CANANDIAGUA, CANNONICUS and the QUINNEBAUG from the mine force. The RIJNDAM and ZEELANDIA, vessels chartered from the Holland-American line, were taken over from the shipping board.

Early in March, the transport service had 104 vessels listed as transports. Sixty-seven of these were freighters converted into troop ships. At the time the armistice was signed, only about 40 vessels were engaged in this service. The transport service suffered two losses during the war, the COVINGTON and the PRESIDENT LINCOLN. The TENADORES, which was in this service at the time of the armistice, has since been wrecked.

Merchant Fleet Lost 151 Ships

During the war, the American merchant marine suffered the loss of 151 ships, 130 of which were sunk during the period of belligerency of the United States. During the same time only 48 of the vessels operated by the navy were lost, of which 14 were submarined, 5 mined, 15 lost through collisions, and 14 lost through miscellaneous reasons. Numbered among the navy's losses were the army transports ANTILLES, submarined when she was two days out from Quiberon Bay, France, on Oct. 17, 1917, the PRESIDENT LINCOLN, torpedoed on return voyage from France, May 31, 1918, and the COVINGTON, torpedoed on the return voyage, July 1, 1918. None of the accidents to the vessels under navy control involved the loss of many lives. The army transports TIPPECANOE, BERWIND, JOSEPH CUDAHY, LAKE EDON and LAKE OWENS were also submarined. The army freighters WESTOVER, TICONDEROGA, SEATIA, WILLIAM ROCKEFELLER, LAKE MOOR and CALIFORNIAN were lost through enemy action; the HERMAN FRASCH, OOSTERDYK, WESTGATE, ZAAMLAND and WEST BRIDGE were lost through collision, and the LAKE BLOOMINGTON, LAKE BORGNE, OPHIR and LAKE WESTON were lost through fire or explosion. Many attempts were made upon the convoys but these were for the most part driven off.

The naval overseas transportation service, commonly known as N. O. T. S., is a distinct organization of the navy. This branch had its inception in a small division which came into existence in the fall of 1917, which took over the few tankers and colliers of the navy for operation. N. O. T. S. was formally organized in January, 1918, and through it was solved the problem of managing what are known as shipping-board vessels, as well as freight vessels for the army in addition to the supply ships of the navy. This newly created branch of the navy began with a fleet of 65 ships, which consisted chiefly of small cargo boats built on the Great Lakes in addition to the navy tankers and colliers. In March of that year, N. O. T. S. began taking over vessels for the army account as well. On Jan. 1, 1919, N. O. T. S. was operating 372 freighters, a total of 580 having been assigned. One year prior the fleet consisted of but 65 vessels, and it was planned to have a fleet of at least 1000 freighters when the American army in France totaled 4,000,000 men.

Since the armistice was signed, many of the requisitioned ships have been turned back to their owners, while others have been converted into troop ships and turned over to the navy transport service. At the present time, however, N. O. T. S. is operating three classes of vessels. The navy's own tankers and colliers, and such freighters as were commandeered to transport navy supplies overseas; commandeered freighters, which were taken to carry army supplies, and shipping board vessels engaged in ordinary commercial trades. Five months after the armistice was signed, the fleet had diminished to about 300 vessels including 58 operated for the navy, 179 operated for army account, and 73 operated for the shipping board. On April 17, N. O. T. S. was operating 92 ships for army account, 44 for navy account and 87 for shipping board account, making a total of 223 vessels. The increase in vessels operated for shipping board account was due to the fact that these vessels were released by the army and switched to board account. At that time approximately 1,300,000 men were still in France, the intention being to reduce the supply fleet as rapidly as the reduction of forces abroad would permit. The necessity of shipping supplies to European nationals, however, tended to check the reduction in the size of the fleet and the service was compelled to hold itself in readiness to resume and increase its operations in case of an emergency.

Records of Sailings

A careful record was at all times kept of the operation of the vessels, a system of photostat reports being adopted. These showed, day by day, where the ship was and what she was doing. In this way defects of operation were remedied, time in port reduced to a minimum and the ship kept in constant essential service. The greatest emergency was present, naturally, while the war was in progress, and the records of N. O. T. S. show that out of the port of New York during September, 1918, it had 100 ships sailing, which was the highest record for any month since this branch of the service came into existence. The number of sailings out of New York in

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December declined to 50 and in February the sailings numbered but 35.

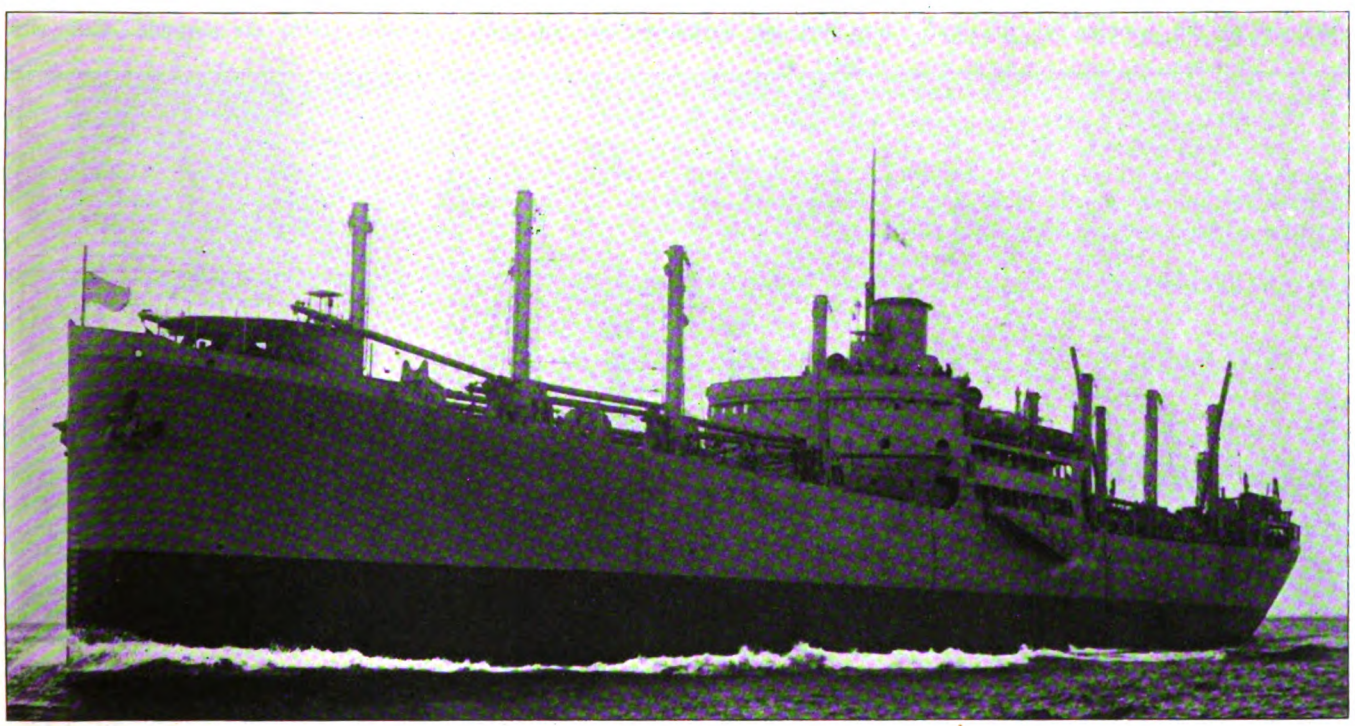
The quick turn-around of the tanker, BROAD ARROW, is a good example of N. O. T. S. management. She is one of the largest tankers afloat, built by the New York Shipbuilding Corp., at Camden, N. J., for the Standard Oil Co. She left Philadelphia and arrived at Port Arthur, Tex., on April 4. She took abroad a cargo of fuel oil and on April 17 had joined a convoy and was bound for Europe. On later voyages, this ship not only carried her usual cargo of fuel oil, but also seaplanes and troops, a strange mixture of cargoes. Another tanker, the MAUMEE, covered approximately 60,000 miles during the 18 months of war. For about three months at a stretch, she shifted from one place to another so quickly and with such uncertainty that mail could not catch up with her. The tanker HISKO took aboard 9000 tons of fuel oil and supplies, and made a turn-around in 48 hours. There are many records such as these. The NERUS took aboard 10,000 tons of coal and made the turn-around in 26 hours. But these were merely incidents.

That the navy should operate supply vessels and transports for the army and supply vessels for its own account was not unusual. At the same time N. O. T. S. was called upon to manage vessels for shipping-board account. These were not ships used in war service, but freight vessels engaged in ordinary import and export trade. The shipping board had not sufficient personnel to man, manage or operate all its ships. The navy was, therefore, called upon to take the vessels over, place a navy crew on board and manage them. Thus equipped, the vessels were let out under agreement of operation to the private interests to transport ordinary freight. These vessels were sent to South American and other ports of the world where the foreign trade of the United States demanded. N. O. T. S. assumed this duty of manning and managing shipping board vessels in June, 1918. During February, 1919, it was managing 79 such vessels for shipping-board account. The shipping board continued turning over new freight vessels to the navy for management up until the first of March of current year, when it was found that the school ships and other recruiting agencies were providing sufficient civilian crews to enable the board to take the vessels back from the navy and have them managed under private agencies.

To manage its own fleet is not merely turning the vessel over to a private agency. The shipping board has sent a committee of experts abroad to make a survey of the situation and out of this is expected to be established some form of European supervising agency. Similar agencies are being established in the United States. When this organization is complete it is probable that the services of the navy will no longer be required on behalf of shipping-board vessels.

When a shipping board vessel was operated by the navy, it carried a navy crew throughout. The navy crews contained about 10 per cent more men than a civilian crew but the wages paid the civilian crew was much more. Take the case of the cargo boat, LAKE VIEW, which is 3090 tons deadweight, 2003 gross or 1200 net. A vessel of this class carried a navy crew of 42 men, inclusive of the gun crew but exclusive of her officers. Now that the guns have been removed, the vessels are carrying an equal number of men in their crews for training purposes. A civilian crew would number but 30 men, exclusive of an armed guard. But in the navy, an ordinary seaman receives but $30 a month, whereas in a civilian crew an able seaman receives $75 a month. The navy has a lieutenant commander in charge of a vessel of this size and he receives but $3500 a year, whereas a civilian master of such a ship, according to the schedule of wages set by the shipping board, receives $312 a month. The navy has a lieutenant, receiving $3000 per annum, in charge of the engine room. A civilian chief engineer is paid $231 per month by the shipping board on a vessel of this class.

The navy has, therefore, not only provided a means for taking care of the foreign trading fleet of the shipping board, but has been managing the transportation of supplies to the army abroad and is today transporting troops home. The navy's part in the ordinary commercial operation of ships will ultimately be withdrawn—it is being decreased each day now but what it has done in the past is a demonstration of the fact that had not the navy been in existence, the United States would have



WALTER A. LUCKENBACH, A TYPICAL EXAMPLE OF A LARGE CARGO CARRIER COMMANDEERED BY THE GOVERNMENT FOR TRANSPORTING TROOPS

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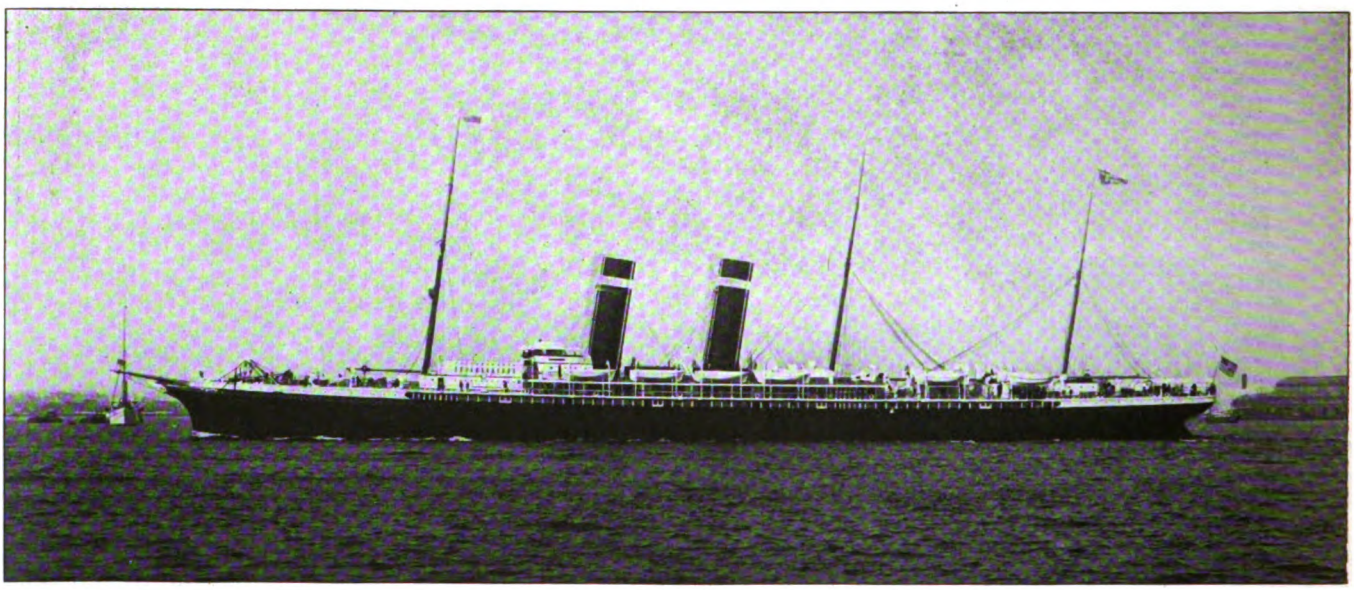
been in a rather sorry plight trying to operate a merchant fleet of adequate proportions to take care of the war requirements.

In 1912, the total merchant steaming tonnage under the American flag was 2,033,100 gross. This total, however, included vessels of all classes from 100 tons up and the bulk was not designed for overseas service and incapable of risking the dangers of the deep. At the outbreak of the war, the naval auxiliary reserve included but approximately 125,000 deadweight tons of ships, but at its peak the N. O. T. S. fleet totaled 2,500,000 deadweight tons. This is representative of the stupendous merchant fleet which was placed under one operating head, a fleet which holds the record of history and one that was primarily contributory to the winning of the war.



HARRISBURG, FORMERLY THE PHILADELPHIA—THIS FAMOUS LINER WAS PREVIOUSLY OPERATED BY THE INTERNATIONAL MERCANTILE MARINE

With this, the navy transported to the military forces supplies, provisions and munitions in a fleet under absolute military control.

All merchant ships available were taken over, including the neutral ships requisitioned by the government as well as private American ships and ships built by the Emergency Fleet corporation. The merchant officers on board the commandeered vessels were given an opportunity to enroll in the navy reserve, but the civilian crews were removed and young men trained by the navy at Pelham bay and other naval training stations were substituted. The chief petty officers were, as a rule, recruited from the regular navy, but for the most part the crews were composed of men unaccustomed to the sea. Operating the vessels under war conditions required approximately 10 per cent more men in the regular crews than are present on merchant ships.

Minor structural changes were made in the private vessels taken over. Gun mounts were installed, although not over two-thirds of the vessels were ever armed for defense. While guns might have been found they were not always available to put aboard. The vessels took the risks in convoy, and only 15 ships, of a total 103,994 deadweight tons, were lost. Six vessels, 42,627 tons, were lost through enemy action, while five, of 44,071 tons, were lost by collision. The remaining four, of 16,994 tons, were lost by fire or explosion.

Under the La Follette act, every petty officer in merchant ships is given a stateroom and these quarters were found unsuitable on many of the privately owned vessels taken over by the navy. The first thing done was to remove all the partitions and turn the quarters into one big dormitory, painted white. Here, under strict military regime, the crews of the N. O. T. S. vessels were quartered and the influence on health and discipline was immediately perceptible. The cleanliness and general good condition of the vessels has been notable.

As before stated, an account of the accomplishments of the fleet would fill many volumes. N. O. T. S. was given notice to prepare to transport 30,000 horses a month to France and there was not an animal transport available. One contractor offered to transform a freighter into an animal transport within 21 days. The navy undertook the job itself and the first animal transport was turned out within five days. Within six weeks sufficient animal transports were provided to load 35,000 horses for France. Upon another occasion, 80-ton locomotives were transported to France in such a condition that within five hours after their landing on the other side they were ready for service. With the cessation of its duties, N. O. T. S. began turning over freighters to the transport service, at least, all such freighters as could be adapted to the movement of troops. A total of 46 such freighters have been converted into troopers.

A considerable amount of work is involved in converting a freighter to a troop ship. In the first place, it is necessary to equip them with metal standee berths in all compartments and deck spaces. Where the deckhead room is 7 feet in the clear, the berths are in tiers of 4, and where less than 7 feet in the clear they are in tiers of 3. They are placed in double rows with 24-inch fore-and-aft passageways, with 30-inch passageways between every 8 berths and in the way of hatch coamings. All the standee berths are portable. Gun racks are clipped to the bulkheads and frames. Racks for the storage of life preservers are provided in all troop compartments and one life preserver for each man is carried, plus the 10 per cent demanded in the specifications.

New lavatories are built in two parts, one fitted with latrines and urinals and the other with showers and wash-basins. Where the toilets are placed 'tween decks, bulkheads are built of a double thickness of spruce laid diagonally and covered with 6-pound sheet lead, which is worked around the base of all bulkheads.

The mess compartments are equipped with permanent white-ash tables, and benches fitted, with the long length of the tables laying fore and aft. The steward's stores are bulkheaded off, and meat boxes constructed. The ship's refrigerator is converted into a chill-room by installing shelves, racks, hooks, gratings and refrigeration piping.

Companionway ladders, 40 inches wide

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and made of yellow pine, are fitted in the way of troop compartment hatches. Wood gratings are fitted over the hatches to provide for a circulation of air. Hospitals, operating rooms, isolation wards and dispensaries are equipped with white enameled standee sick-bay berths. These are placed in double rows, two high. Two such sick-bay berths are fitted into the ships for each 100 persons carried.

The space on the upper 'tween decks is set aside for first-class quarters to accommodate army officers. This is divided into staterooms, lavatories, dining salons, pantries and lounges. The officers' staterooms are equipped with double standee berths, built fore and aft. The vessels are equipped with steam heat and electricity. Navy crew quarters are installed. Furthermore it is necessary to build a steam galley, serving station, bake shop, butcher shop, storeroom, etc.

By the middle of March, 22 freighters had been converted in this manner to troopers and had sailed. At that time, 27 other freighters were being converted and 18 additional had been designated for this service. The contract to convert the first freighters was let on Dec. 7, 1918. The first converted freighter sailed for Europe on Jan. 18, 1919. This was the BUFORD. It was estimated that the transport capacity of the first 22 converted freighters was nearly 800 officers and approximately 50,000 privates.

Uses All Available Ships

In transporting troops to Europe use was made of foreign steamship lines, especially the British. Since the armistice, however, there has been as great demand in Australia, Canada and other outlying provinces for the immediate return of the troops as in the United States. England has not been capable of rendering nearly as much assistance in returning our troops as she was in sending them over in the first place. For this reason the navy transport service has been compelled to grow with leaps and bounds. Today, our troops are being returned on British as well as French and Italian liners. As a matter of fact, every available passenger accommodation is being taken up by the army.

The navy transport fleet was able to bring back approximately 97,000 troops during January, and a like number during February. During March, however, when the transport fleet was greatly augmented, it was able to bring back approximately 170,000 troops and even a larger number during April. Of the number returned during March, 100,000 troops were landed at New York, the remainder being returned through Newport News, Va. At the present time only these two ports are being used as debarking ports, although Charleston, S. C., has been used. One shipload of New England troops were returned to Boston. During March, some 16,000 casuals were returned on the navy transports. This is considered quite an accomplishment inasmuch as the space on board ship required for one casual is double that required for a healthy soldier. At that time there remained in France some 50,000 more casuals to be brought home. Since that time the number has decreased materially.

Condensed Reviews of Latest Books

Practical Ship Production, by A. W. Carmichael, cloth; 252 pages, 5¾ x 9 inches; published by the McGraw-Hill Book Co., Inc., and furnished by THE MARINE REVIEW for $3.

The author is a lieutenant commander, construction corps, United States navy. He points out that it was his intention in presenting this book to give in convenient form the most important, general principles of steel ship design with which every naval architect should be thoroughly familiar, and to describe the numerous processes involved in steel shipbuilding.

The forepart of the book is devoted to a general description of ships in which such subjects as buoyancy, trim, propulsion, etc., are explained. The various members that enter into the construction of steel ships are next described. Numerous illustrations are included to make clearer the various parts referred to in the text.

The design of ships is next explained, followed by a concise description of shipyards. The tools used in a steel shipyard are covered in this chapter which also includes a description of the various trades employed in steel shipbuilding.

The chapter devoted to preliminary steps in ship construction will prove of value to comparatively new yards as many perplexing problems are clearly explained. Ordering material, making molds, patterns, templates, etc., are described; followed by a discussion of the fabrication of hull material.

The actual erection of the ship is next taken up. This section of the book contains numerous photographs taken under actual working conditions, showing the various steps involved from the time the keel is laid until the ship is ready to take the water. The subjects of drilling, reaming and riveting are fully treated and examples of good and bad joints shown. This chapter also explains how to cut out poor rivets which must be replaced before the work passes inspection. Chipping and caulking are described and illustrations are included to show just how the tools used in this operation should be handled. The use of the red-lead putty gun for stopping seams that cannot be made tight by caulking is described. A sectional illustration of this tool is included to show how it works.

A concise description of welding practice as applied to shipbuilding is given which will prove of value to those seeking information on this comparatively new innovation in the steel shipyard. The launching and fitting out of a vessel is treated. The book is well written and will be of value to those employed in steel shipyards.

Submarine and Anti-Submarine, by Sir Henry Newbolt; cloth; 312 pages, 5 x 7½ inches; published by Longmans, Green & Co. and furnished by THE MARINE REVIEW for $2.25.

The author is well known as a writer of sea literature and in the present volume he has included a number of authentic narratives pertaining to submarine warfare. It is pointed out that the book is not an epic and that fully half of it is mere technical detail while the remainder is fact, plainly told.

The author traces the evolution of the undersea boat from its earliest conception to the present day. He lays emphasis on the fact that the submarine is in no wise a German invention or development. Among the introductory chapters is one on the submarine in war as an illustration of the contrast between the national spirit of England and that of Germany. Written by an Englishman, the book is intensely anti-German throughout although the author does not overdraw his conclusions. His information is drawn from official sources and he describes vividly just what submarines have done and can do and how the British navy set about to quell and

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restrict the unwarranted, piratical attacks made on merchant vessels.

Various factors pertaining to the whole subject of submarine warfare are fully explained. The book is written in clear language wherein the author takes the reader with him through a submarine and explains its workings thoroughly and by means of descriptions drawn from actual warfare, the whole submarine policy is set forth in an instructive manner.

The book closes with an intensely interesting account of how Zeebrugge and Ostend were rendered helpless. He points out that the conception of this attack was in itself conclusive evidence of a high heroic spirit and that the enterprise was not a wild cat scheme but a carefully planned attack wherein every detail was carefully worked out beforehand.

The book is interesting not only to those engaged in maritime pursuits but to all persons young and old as it is a vivid portrayal of how the Hun pirates were vanquished and their ambitions to control the underseas effectively checked.

Practical Seamanship, by John Todd and W. B. Whall; cloth, 385 pages, 5½ x 9 inches; published by George Philip & Son, Inc., and furnished by THE MARINE REVIEW for $3.

This book, which is now in its fifth edition, is written for those entering the merchant service and the authors give much attention to details of which a thorough knowledge must be acquired. While modern steam cargo carriers have, to a great measure, replaced sailing craft, the authors have endeavored to meet the demand which still exists for technical and practical knowledge regarding sailing vessels. For this reason both kinds of craft are given attention.

Illustrations to the number of 168 are included, which aid materially in making the meaning clear on many subjects that cannot be comprehended fully from descriptive matter.

The first part of the book is devoted to a short history of sailing vessels, followed by a description of these craft, directions for setting up rigging, repairing leaks, rigging jury rudders, etc. Steam vessels are fully described and much attention is given to the duties of officers, keeping an accurate log book, stowage of cargo and the care of small boats.

Much valuable matter is included on handling steamers in heavy weather. The chapters devoted to this subject are especially interesting at the present time, owing to the fact that many young officers have no other way of gaining knowledge of subjects of this kind aside from fortifying themselves as far as possible with the experience gained by veteran masters in actual encounter with heavy weather.

Another subject which the authors treat exhaustively is the raising of sunken vessels. As much attention will undoubtedly be paid to this subject in the near future, the illustrations and directions given are of great interest.

Elements of Wood Ship Construction, by W. H. Curtis; cloth; 223 pages, 6 x 9 inches; published by the McGraw-Hill Book Co., Inc., and furnished by THE MARINE REVIEW for $2.50.

The book in question was prepared by the author for the education and training section of the Emergency Fleet corporation. It is intended for the use of carpenters and other artisans who, while skilled in their special lines of endeavor, lack the detailed knowledge of ships necessary for the efficient performance of the work in shipyards.

The book contains 199 illustrations, with the object of making the written explanations clear. The text fully describes the construction of a wooden ship from her keel up. Correct names for the various parts of a wooden ship are given and, taken as a whole, while elementary, the book will prove of value to those engaged in the construction of wooden vessels.

Storage—by H. B. Twyford, Otis Elevator Co; cloth, 200 pages, 6 x 9 inches; published by D. Van Nostrand Co. and furnished by THE MARINE REVIEW for $3.50 net.

Storing raw and manufactured articles forms a line of economic endeavor, which has not been appreciated to its fullest extent. Lack of proper storing constitutes a handicap to any business, and more especially to a manufacturing enterprise. The winter transportation difficulties of 1917-18 focused attention upon the danger of limited storing capacity. Post-armistice cancellations emphasized the folly of unlimited hoarding of supplies and manufactured articles. These two extreme instances serve to demonstrate the problem as one worthy of study by the executive. The first portion of this book is devoted to a discussion of the economic aspects of the storage problem. Stored material is considered as a source of wealth, capable of appreciation in value only through an advance in price, but subject to loss through storing cost, and a number of depreciation factors. Details relating to the best modern storage practice occupy the remaining portions of the book. Emphasis is placed upon the correct description, records and inventory as essential to economical storing. Location, equipment and storeroom appliances as factors in decreasing cost, occupy a number of chapters which are well illustrated from photographs. Inspection, receiving and delivery are discussed. Ledger, card and memoranda forms are suggested for these details of storing. The author handles the entire question as a problem in business procedure and his discussion is in the character of a summation of modern experience.

Modern Shipbuilding Terms, by F. Forrest Pease; cloth; 214 pages, 4½ x 7½ inches; published by J. B. Lippincott Co., and furnished by THE MARINE REVIEW for $2.

Shipbuilding, in common with other trades involving a multiplicity of operations, has its own peculiar trade terms and names. While the average man might become familiar with all the terms used in shipbuilding through lifelong study and observation in shipyards, this method cannot be employed by all those who constantly need first hand information at a moment's notice. Shipbuilding in this country has rapidly become a major industry. Particularly for the purpose of enabling the shipworker and others interested in shipbuilding to learn the correct trade names pertaining to the trade, the present book was written.

The first 102 pages are devoted to shipbuilding terms arranged in alphabetical order for ready reference, with headings followed by concise explanations. This section is followed by six appendices devoted to the following subjects: List of shipyard trades, electric welding, symbols used in electric welding, Isherwood system of shipbuilding, cutting and welding and a list of books on ship construction. It is pointed out that the list of shipyard trades is fairly indicative of the trades employed in steel shipbuilding but that the duties may vary somewhat with particular yard organizations.

The material on electric welding is quite complete and concise. It is illustrated to show the types of joints, design of welds, position of welds, etc., and the combinations of symbols used to designate on the blueprint the type of weld to be used.

The description of the Isherwood system explains in brief this particular type of construction. Autogenous welding and cutting by means of the oxyacetylene torch has received widespread attention during the last few

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years and the author describes in detail the methods used, explaining the apparatus employed, how to light the torch and control the flame, how to operate the torch, back firing, points to be observed, etc.

A selected list of books on ship construction and equipment is included which is arranged for the benefit of those seeking exhaustive information on particular subjects.

The last section of the book contains 68 full-page illustrations showing ship construction details. These illustrations are keyed by means of letters to enable the reader readily to distinguish the numerous details shown.

The author is a practical seaman, a skilled machinist and a trained electrician. Combined with these qualifications, he has been able to put his practical knowledge into words for the benefit of others.

New Steamship Firms

New steamship companies incorporated during April have a combined capital of but $2,400,000, according to the New York *Journal of Commerce*. This is a sharp decline from the March record which was $9,276,000. The February record was $6,400,000, and the January $7,525,000.

The incorporations during April were as follows:

Albania American Steamship Co., N. Y...	$500,000
African Steamship & Sawmill Co., The, Delaware	1,000,000
Deepwater Ship Co., Del.	100,000
Lloyd Portuguez Navigation Co., N. Y....	100,000
Pacat Lines, Inc., N. Y.	200,000
Scandinavian-Amrican Shipping Co., Del...	100,000
Triad Shipping Co., N. Y.	100,000
Williams Steamship Co., Del.	300,000
Total	$2,400,000

New Member of Ship Board

Henry M. Robinson Appointed to Shipping Board, Succeeding Charles R. Page

HENRY M. ROBINSON of California has been appointed a member of the shipping board to take the place of Charles R. Page who recently resigned, according to a statement from the White House.

Mr. Robinson was born in Ravenna, O., in 1869. He is a graduate of Cornell university and as an engineer he has had a wide and varied experience. He has organized a number of mining, electric light and power and other engineering enterprises and has had experience in shipbuilding.

During the first year of the war, he served on the council of national defense. Last July he became an assistant to the chairman of the shipping board. After the armistice was signed, he assembled the necessary shipping data for use of the peace conference and in January he sailed for Europe to serve as special shipping commissioner.

When Chairman Hurley returned to the United States, Mr. Robinson remained abroad in charge of the shipping board organization. He was the American shipping representative at the Spa conference and presided over the inter-allied conference at Brussels when the IMPERATOR and other German ships held in German ports were allocated.

Mr. Robinson has been associated with Samuel Gompers on the labor committees of the allied nations and the United States and also he has been serving with Messrs. Baruch, Hoover and Lamont as one of the president's advisers in economic matters.

Mr. Robinson makes the tenth member of the shipping board since the original board was formed in the first days of 1917 under the chairmanship of William Denman, San Francisco. Four of the original members of the board resigned in 1917. Bernard N. Baker, who has since died, resigned almost immediately after his appointment.

During the summer of 1917 came the unfortunate Goethals-Denman controversy over the wooden ship program, ending with the resignation of Mr. Denman. About the same time the resignations took place of John B. White, Kansas City, and Theodore Brent, New Orleans. The places of these members were taken by Edward N. Hurley, who succeeded Mr. Denman in the chairmanship of the board; Raymond B. Stevens, New Hampshire, Bainbridge Colby, New York City, and Charles R. Page, San Francisco.

Since Dec. 1, 1918, Charles R. Page and Bainbridge Colby have retired from its membership. John A. Donald, of New York, president of the Donald Steamship Co., which was absorbed by the Oriental Navigation Co., is the only remaining one of the five original members. T. A. Scott, of the T. A. Scott Wrecking Co., New London, Conn., has been mentioned as the successor of Mr. Colby on the board.

Mr. Robinson resides in California, this state having had recognition previously in the appointment of Mr. Denman and Mr. Page.

1919 Great Lakes Red Book Now Ready

THE 1919 edition of the GREAT LAKES RED BOOK is now being distributed. It lists 332 fleets and over 1000 separate vessels, with the names of the captains, engineers and owners of each vessel. As in previous editions, it is conveniently indexed to enable the user instantly to find the information he is seeking. This is arranged by means of an alphabetical list giving the names of all vessels, each name being followed by a designated fleet number. This index is followed by a list of owners, masters and engineers. The superintendent of each steamship line is also included. This section is followed by a list giving the gross tonnage capacity of all ore carriers operating on the lakes. The gross tonnage is figured at approximately 19-foot draft. Both steamers and barges are listed, each type being properly designated. This is the sixteenth edition of the GREAT LAKES RED BOOK and, as in past seasons, it is enjoying a wide circulation due to the fact that those interested in Great Lakes maritime affairs have come to rely upon it as the most authentic means for information of this kind to be had. A list of supply houses, fuel docks, repair facilities, etc., at each port is also included. The convenient size of the book, 3 x 4¾ inches, permits it to be carried in the pocket without inconvenience, thus providing a means of ready reference. The book is printed on heavy paper.

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Diesel Engines Prove Successful

Mount Hood, a Western-Built Motorship, Completes a Long Successful Voyage—Her Diesel-Type Engines Prove Economical in Operation

DIESEL-TYPE engines used by the Globe line on several of its fleet have offered the company the opportunity to determine the economy of this means of propulsion. The line has two vessels equipped with these engines and has two motor schooners equipped with semidiesel engines. The MOUNT HOOD is one of the fleet equipped with diesel-type engines. This vessel has a keel length of 285 feet, an extreme beam of 44 feet 7½ inches, and a molded depth of 26 feet. She was built at Portland, Oreg., by the Supple-Ballin Shipbuilding Corp., and was the first vessel built on the new type of construction designed by F. A. Ballin. She has double-diagonal planking and steel plate topsides. Her type was fully described in the September, 1917, issue of THE MARINE REVIEW.

The vessel was designed to reduce the structural weight of wooden vessels without sacrificing strength. The actual structural weight of the MOUNT HOOD, fully equipped and ready for sea, is nearly 25 per cent less than that of a wooden vessel of the conventional design. She has carried a total deadweight, including fuel and stores, of practically 4600 tons. Her gross tonnage is 2909 and her net tonnage 2433. She is equipped with two sets of 8-cylinder engines, full diesel type. She has sufficient fuel capacity to give her a steaming radius of 15,000 miles, on a fuel consumption of 30 barrels, or 4 tons of oil per day.

When the engines for the MOUNT HOOD were built, they were the largest diesel-type engines for marine work constructed in the United States. Since then, however, the McIntosh & Seymour Corp., Auburn, N. Y., have contracted to build for the Emergency Fleet corporation some marine diesel engines of between 800 and 900 horsepower. The two engines on the MOUNT HOOD have a capacity of but 500 horsepower each.

Favor Twin Screws

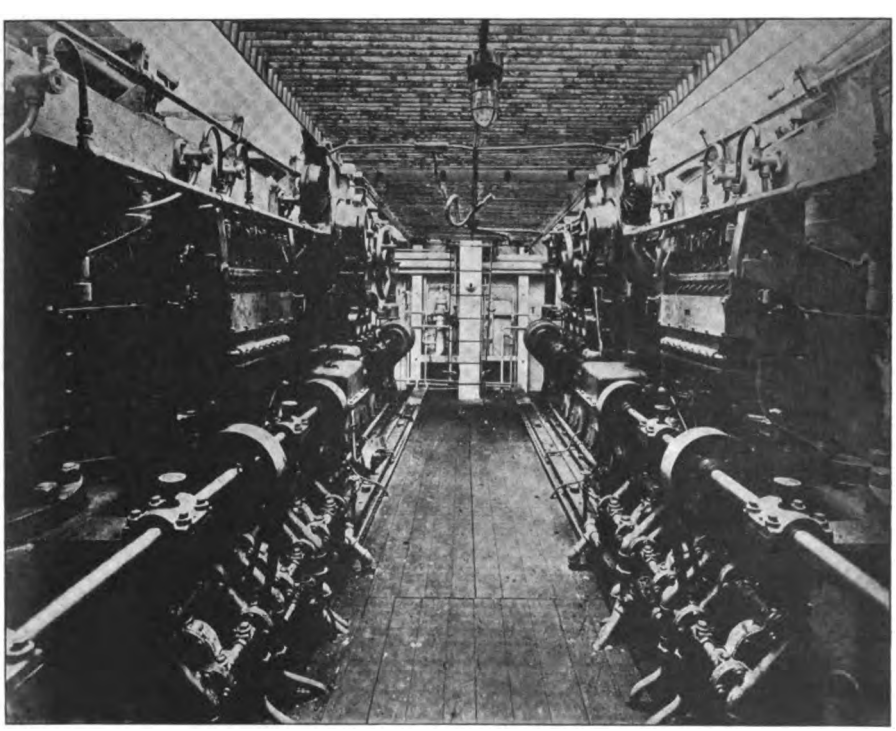
The preference of many shipowners is for two diesel engines in a vessel driving twin screws. The engines in the MOUNT HOOD are 8-cylinder each, 12⅛-inch diameter by 18-inch stroke. They were the largest commercial diesel engines produced up to 1918. After a voyage to South America and back, some 8000 miles, it was reported that there had been no trouble whatever from hot bearings or lubrication, nor had any weakness of any of the parts developed.

The MOUNT HOOD left San Francisco on Oct. 17, 1918, and arrived at Arica, Chile, on Nov. 14, proceeding to Pisagua, Chile, on Dec. 12. She carried a cargo of lumber on her way down and proceeded back with a cargo of nitrates. She arrived at Mobile, Ala., on Feb. 5, 1919, and was drawn up on a marine railway for painting and ordinary repairs. The trip down to Chile was approximately 4700 miles and the trip back to Mobile was about 3200 miles.

The first fuel oil for these engines was contracted for in 1917, at $1.87 per barrel on the Pacific. The oil was delivered early in 1918. The price of oil during the war was $3.60 per barrel, although another of the Globe's vessels paid as high as $12 per barrel at Arica, Chile. The present price of oil for these engines is $2.30 per barrel. According to the log of the ship, between 1000 and 1200 gallons of oil were consumed each day. Counting the few hundred barrels taken on in South America, the ship had taken aboard 2400 barrels of oil for the trip both ways, and had 800 barrels in her tanks upon reaching Mobile. In other words she had burned approximately 1600 barrels of oil to make a voyage of 8000 miles.

The average consumption of oil was 0.2 barrels or 8.4 gallons per mile. The MOUNT HOOD transported 3800 tons of cargo on the voyage south and brought back 4100 tons of cargo. It is, therefore, estimated that the vessel burned 0.0021 gallons of oil per cargo ton-mile. Estimating this at the present market value of oil, the average fuel cost of the trip was $0.01155 per 100 ton-miles.

The economy of diesel engines on freight boats it is pointed out is clearly demonstrated by the experience on the MOUNT HOOD. With larger engines on larger boats corresponding economies in operation can be effected. The Globe line, naturally, had its initial trouble procuring engineers for the MOUNT HOOD and her sister ship, the MOUNT BAKER, but an entirely satisfactory staff of engineers has since been built up. It has been necessary to take engineers wherever they could be found. In some instances their men had reported experience in the machine shops building this type of engine, and in other cases not. Some had not even had sea experience. The difficulty of the future will be to find engineers with the technical knowledge of diesel design and the proper sea experience. At this time the government has not even devised an examination for engineers which would meet the requirements. The old forms of seamen's examinations have been applied and considerable latitude permitted



LOOKING FORWARD IN THE ENGINE ROOM OF THE MOUNT HOOD—THE 8-CYLINDER ENGINES ARE 500 HORSEPOWER EACH AND DRIVE TWIN SCREWS

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during the war with satisfactory results.

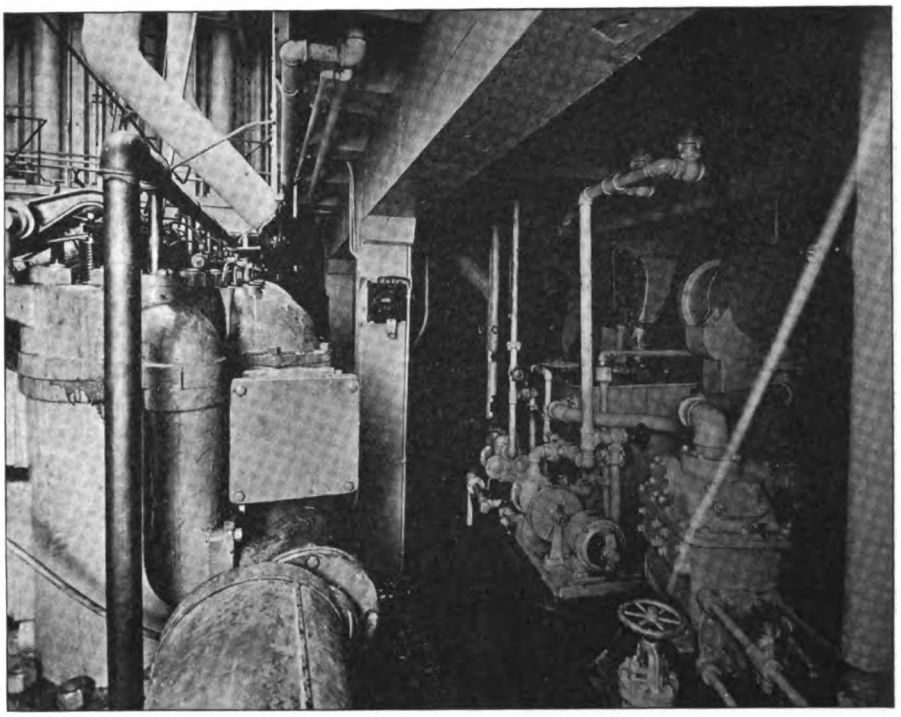
Engineers for diesel engine boats can command a premium above the salaries fixed by the shipping board. The higher wages do not affect materially the economy of the vessels. The MOUNT HOOD carries a crew of but 28 men all told. This crew includes but four engineers, three oilers and one donkeyman. It is necessary to have but one engineer and one oiler on duty at a time.

Buys Wood Ships

Considerable interest by shipping men is being taken in the project put on foot by the Nacirema Steamship Co., of New York, when it recently purchased 15 wooden vessels from the shipping board. In view of the widely published opinions of many shipping people that the wooden ships built for the government were not seaworthy and were poor ventures, the official announcement that these vessels had been sold for transatlantic operation at approximately $650,000 each came as a surprise. The statement issued by the shipping board said the vessels had been sold for $145 per ton, where it is learned from the officers of the purchasers that they paid but $140. The Nacirema Steamship Co. is a new Delaware corporation with a capital stock of but $500,000. The shipping board did not make public the terms of payment granted the purchasers, and the shipping company refused to discuss this feature.

It is understood, nevertheless, that the purchasing company has been given permission to transfer the flag or to sell any of the vessels purchased to citizens of any allied or neutral country when and after the purchase price agreed upon has been fully paid. The Brooks Steamship Corp., New York, a Delaware company with a capital stock of $500,000 officered by some of the directors of the Nacirema company, will operate the vessels. The Brooks company is represented in New Orleans by W. H. Cowley, and in Philadelphia by Megee, Steer & Co.

The Nacirema Steamship Co. is not without experience in shipping, as attested to by the personnel of its officers and directors. The president is J. M. Marshall, a member of the law firm of Van Vorst, Marshall & Smith, New York. The directors are Amos D. Carver, of the ship chandler firm of Baker, Carver & Morrell, New York; Sheppard Schermerhorn, formerly vice president of the United Fruit Co. and now president of the River Plate Commercial Co., New York; Pierpont Davis, of the National City Co., New York; F. R. Eaton, of the Foreign & Domestic Transportation Corp., New York; Capt. W. A. Brooks, president of the Brooks Steamship Co., New York, and F. Bradley Cox, treasurer of the Brooks Steamship Co.



MUCH OF THE AUXILIARY MACHINERY IS PLACED FORE AND AFT BACK OF THE ENGINES

The purchasers have opened negotiations with the shipping board for the purchase of 15 more vessels of the same type and for immediate delivery. As a matter of fact, at the offices of the Brooks company it was learned that the purchasers desire to obtain 30 more of these vessels upon the same terms the first 15 were purchased. These are the highest type of wooden vessels built for the Emergency Fleet corporation. They are known as the Daugherty type, built by the National Shipbuilding Co., Orange, Tex. They were described in THE MARINE REVIEW, April, 1918. Ten of these were purchased, whereas the other five are of the Ballin type, a description of which was published in THE MARINE REVIEW of September, 1917. The latter were built in the Supple & Ballin yard at Portland, Oreg. These vessels are differently designed from the so-called Ferris and Hough types. They have more sheer and therefore are better adapted to ocean service. They are all coal burners. Some of them are equipped with turbine engines. Eight have made several trips successfully but seven are being accepted just as they come from the shipyard.

All restrictions have been removed by the shipping board. There will be no control of the rates charged or of the routes in which they are to engage. The operating company in- tends to put them in service between New Orleans and France, New Orleans-Scandinavian ports, New York-France, New York-Scandinavia, New York-Roumania, and Havana-Spain. One vessel has started for Havre and another is leaving. A third sailed on May 10 for Rotterdam. Food, agricultural implements and general cargo is being carried, and the operators anticipate fair returns. More cargo than can be accommodated is being offered, it was declared and a prosperous period of operation for at least two years ahead is expected.

The five vessels delivered to the company at New Orleans are each 4700-ton deadweight. They are the BEECHLAND, ZAVALLO, COWARDIN, NEABSCO, and HORADO. The five ships to be delivered at Havana are also each 4700 deadweight tons. They are the NAWITKA, ITOMPA, NATENNA, ALDERMAN, and ARGENTA. The five vessels to be delivered at New York are each 4000 deadweight tons. They are the DALANA, THALA, AIRLIE, ASHBURN, and BIRCHLEAF. The 4700-ton ships are Daugherty type, the 4000-ton Ballin type. The BEECHLAND was the first ship to sail. She left New Orleans for Havre. At present the company is loading ships only at New York and New Orleans.

The first of the Ballin-type steamers were sold to Gaston, Williams & Wigmore, of New York, to be operated by the Globe line. They have been in service some time now and have done well according to reports.

The shipping board in April stated that 115 wooden ships were in service. Of 703 contracted for, 214 had been canceled.

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Ore on Dock May 1

Ore held on Lake Erie docks on May 1 was slightly in excess of the balance on the corresponding date a year ago. Statistics gathered by THE MARINE REVIEW from various dock managers at Lake Erie ports show that the amount of ore on Lake Erie docks May 1, was 5,681,085 gross tons, compared with a balance of 5,622,019 gross tons on May 1, 1918, an increase of 59,066 gross tons. The corresponding figures for 1917 and 1916 were 4,772,232 and 3,343,405 gross tons.

Total rail shipments from Lake Erie ports to furnaces during the winter season from Dec. 1, 1918, to May 1, 1919, were 4,774,037 gross tons, as shown in the following table:

	Tons
On dock Lake Erie ports, Dec. 1, 1918.	10,455,122
On dock May 1, 1919	5,681,085
By rail to furnaces, winter of 1918-19	4,774,037

Winter shipments during 1917-1918 were 4,704,330 tons.

The amount of ore shipped to furnaces during the 1918 navigation season was 43,349,912 gross tons which, added to the winter shipments, gives a total of 48,123,949 gross tons of ore forwarded to furnaces over these docks in the year ended May 1, 1919. This total compares with 47,963,072 gross tons moved in the corresponding period ended May 1, 1918; 50,378,445 tons in the year ended May 1, 1917, and 40,716,358 tons in the year ended May 1, 1916.

The following table shows the ore on docks at the close of the 1918 navigation season and at the opening of the 1919 season:

	Gross tons	
Port	May 1, 1919	Dec. 1, 1918
Buffalo	392,623	525,947
Erie	369,978	439,094
Conneaut	731,503	1,703,701
Ashtabula	1,740,072	3,292,738
Fairport	326,621	510,855
Cleveland	1,259,120	2,117,176
Lorain	190,003	828,384
Huron	429,200	607,233
Toledo	241,965	399,839
Totals	5,681,085	10,455,122

April Ore Shipments

Ore shipments for the opening month of 1919 are far ahead of the tonnage moved in the corresponding month last year. This resulted from the early opening this spring, while last year boats were delayed by ice until toward the close of the month.

Shipments of ore from upper lake ports during April were 1,412,239 tons, compared with 235,870 tons in April, 1918, an increase of 1,176,369 tons. April, 1917, shipments were 211,532 tons. Detailed shipments follow:

	Gross tons	
Port	Apr., '19	Apr., '18
Escanaba	71,417	.....
Marquette	.....	10,708
Ashland	147,368	.....
Superior	101,730	99,562
Duluth	794,050	56,991
Two Harbors	297,684	68,609
Total	1,412,239	235,870
1919 increase	1,176,369	.....

Soo Canal Report

Freight movement through the Soo canal in April, 1919, shows a substantial increase over the opening month of last season. The total tonnage for last month of 2,373,163, compared with the total for April, 1918, of 422,489 tons, shows an increase of 1,950,674 tons. The comparison of tonnage figures for the past six years is as follows:

	Net tons
April, 1919	2,373,163
April, 1918	422,489
April, 1917	258,290
April, 1916	2,215,362
April, 1915	1,434,735
April, 1914	744,520

From this summary, it is seen that the total tonnage carried for the month of April of the present year exceeds by 157,801 tons the large shipments for April, 1916. The United States canal opened on April 10 while the Canadian canal opened two days later. Of the total freight carried in April of the present year, 2,089,965 tons were handled by the United States canal while 283,198 tons went through the Canadian canal.

The following tabulation gives the figures in detail for 1919 and 1918:

	To May 1, 1919	To May 1, 1918
EAST BOUND		
Lumber, M. ft. B. M.	2,650	200
Flour, barrels	.....	.....
Wheat, bushels	16,729,000	4,441,647
Grain, bushels	4,176,041	2,083,029
Copper, net tons	.....	.....
Iron ore, net tons	1,139,326	147,188
Pig iron, net tons	.....	.....
Stone, net tons	1,900	.....
General merchandise, net tons	11	7
Passengers, number	3	0
WEST BOUND		
Coal, soft, net tons	415,824	88,078
Coal, hard, net tons	142,864	0
Iron ore, net tons	.....	.....
Mfgd. iron and steel, net tons	2	0
Salt, net tons	5,000	0
Oil, net tons	46,656	0
Stone, net tons	.....	9,200
General merchandise, net tons	6,551	3,915
Passengers, number	13	.....
SUMMARY		
Vessel passages, number	716	187
Registered tonnage, net	2,090,769	401,465
Freight—		
Eastbound, net tons	1,756,266	321,296
Westbound, net tons	616,897	101,193
Total freight, net tons	2,373,163	422,489

Lake Erie Receipts

Out of a total of 1,412,239 tons shipped from upper lake ports in April, Lake Erie ports received 671,005 tons, as shown by figures compiled by THE MARINE REVIEW. The balance on dock May 1 was 5,681,085 tons against 5,622,-019 tons on May 1, 1918. Detailed figures are:

Port	Gross tons
Buffalo	27,194
Erie	.....
Conneaut	366,775
Ashtabula	46,750
Fairport	66,178
Cleveland	71,091
Lorain	43,882
Huron	20,480
Toledo	.....
Detroit	28,655
Total	671,005

April Lake Levels

The United States lake survey reports the monthly mean stages of the Great Lakes for the month of April, 1919, as follows:

Lakes	Feet above mean sea level	
	March	April
Superior	601.89	602.02
Michigan-Huron	580.74	581.02
St. Clair	575.39	575.88
Erie	572.48	573.05
Ontario	246.01	246.43

Lake Superior is 0.13 foot higher than last month, 0.58 foot higher than a year ago, and 0.45 foot above the average stage of April of the last 10 years.

Lakes Michigan-Huron are 0.28 foot higher than last month, 0.39 foot lower than a year ago, and 0.84 foot above the average stage of April of the last 10 years.

Lake Erie is 0.57 foot higher than last month, 0.79 foot higher than a year ago, and 0.75 foot above the average stage of April of the last 10 years.

Lake Ontario is 0.42 foot higher than last month, 0.74 foot lower than a year ago, and 0.09 foot above the average stage of April of the last 10 years.

The Union Water Meter Co., Worcester, Mass., has presented to the steamship WORCESTER a marine whistle similar to those which the company has furnished for use on torpedo boat destroyers. The steamer was launched on March 29, at Groton, Conn., the name selected being a reward for the city's large oversubscription to the last Liberty loan.

The Universal Shipbuilding Co., Sturgeon Bay, Wis., is to build two steel ships to be used in the lumber trade between South Africa and New York.

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Practical Ideas for the Engineer

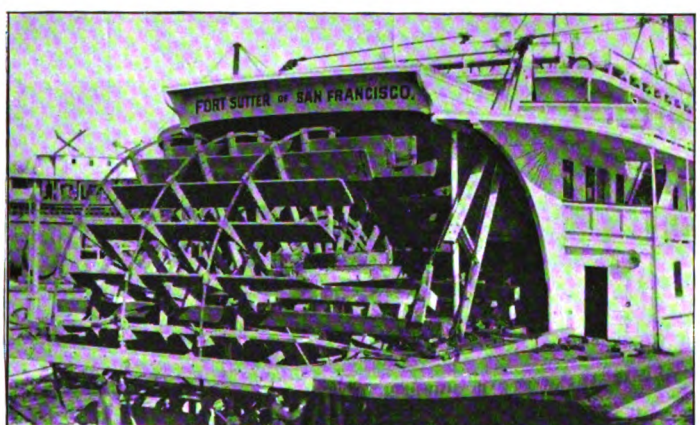
Wheel Shaft Repairs—Arc Welding—Drill for Square Holes—Tests on Boat Releasing Device—Crankshaft Turning—Boiler Setting Cement

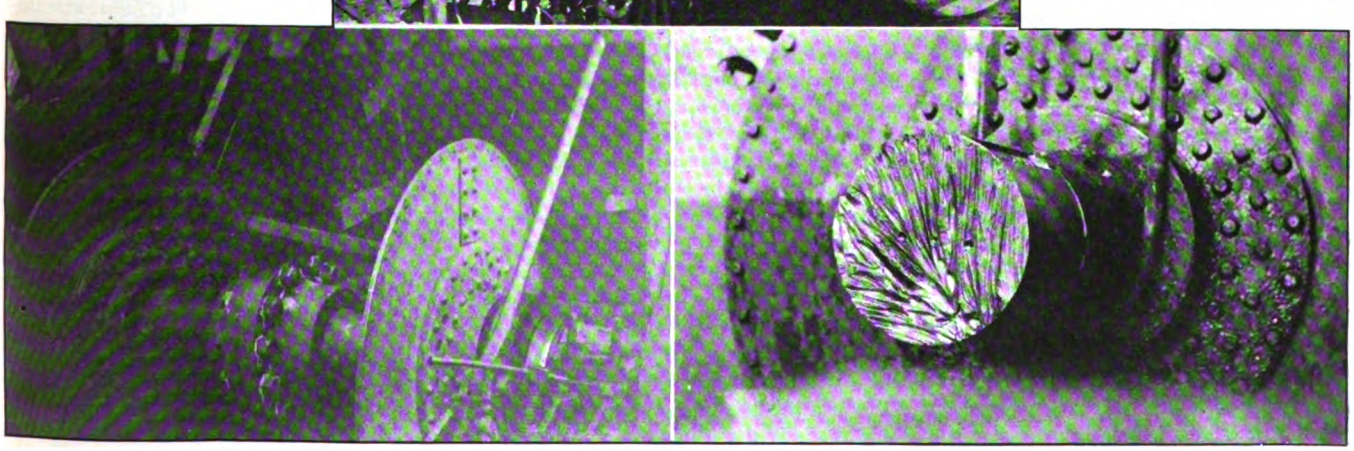
THOSE engaged in marine repairs are often confronted with perplexing problems which tax the mechanical ingenuity of the repair-gang boss to the utmost. The accompanying photographs, which were submitted by James Burns, marine superintendent of the California Transportation Co., San Francisco, show how the stern-wheel shaft of the steamer FORT SUTTER was recently repaired without wholly dismantling the wheel. This type of craft is common in west coast waters that are comparatively landlocked.

The shaft in question, during the past season, developed a crack outside the outer flange on the starboard side. As this shaft is 13 feet 6 inches in diameter and 26 feet 6½ inches long, it is readily seen that it would be a difficult and costly job to replace it with a new one. Not only would this procedure involve the cost of the new shaft but a heavy labor expense would be included in dismantling and reassembling the wheel. It was finally decided to replace part of the shaft only. A section of shaft, 7 feet long, was made, the inner end of which was equipped with a coupling as shown in the lower left illustration. The vessel was then laid up with her wheel supported by timbers. The outer bucket arms and bands were removed and the damaged end of the shaft cut off. Next a turning device was located on the shaft and a portion turned to accommodate the other half of the coupling that was carried by the new end of the shaft previously made. A keyseat was also cut in which the coupling key was to fit. The shaft, with these operations complete, is shown in the lower right illustration. The coupling was then fitted in place. The upper illustration shows the partially dismantled wheel during the repair operations.

While these operations were in progress, the shop gang took the crank and eccentrics off the damaged end of the shaft and installed them on the new section. The coupling was also put in place. The new section of shaft was then coupled in place and the wheel built up. The steamer was then ready for service. steamer was then ready to be put in commission.

The repair operations consumed seven working days of eight hours each. Mr. Burns points out that the time might have been reduced somewhat, but as the entire vessel was repainted and other minor repairs attended to, emergency speed was not required. Minor repairs consisted of overhauling the engines, boilers and auxiliary machinery which cannot be done while the vessel is in commission.





THE UPPER ILLUSTRATION SHOWS THE WHEEL OF THE FORT SUTTER PARTIALLY DISMANTLED FOR REPAIRS—THE LOWER LEFT ILLUSTRATION SHOWS THE NEW SECTION OF SHAFT COUPLED IN PLACE, WHILE THE VIEW AT THE LOWER RIGHT SHOWS THE END OF THE OLD SHAFT TURNED AND KEYSEATED TO ACCOMMODATE THE COUPLING WHICH JOINS THE TWO SHAFT SECTIONS

To Preserve Piles

Good results have been obtained in Denmark by impregnating pine and beech timbers with tar oil. A number of heavy piles driven in 1902 were in 1912 found to be still saturated with oil and in perfect condition, while unimpregnated timber was entirely destroyed by the ravages of pile worms. The state railways now demands that all timber used for marine purposes must be treated with tar oil. It has not been found possible to impregnate the heartwood of good pine timber as the cells are already filled with resin, but it is important that the sap wood is uniformly saturated with oil and protected against attacks by pile worms.

Timber to be impregnated is enclosed in a steel cylinder large enough to contain the longest piles and is first subjected to a vacuum continued until all moisture is extracted, when heavy coal tar oil, at high pressure, is pumped into the cylinder. The specific gravity of the oil must not be less than 1.04 nor more than 1.10, with an evaporation not exceeding 25 per cent of its volume when heated to 482 degrees Fahr. Light oils are not suitable. The quantity absorbed by pine

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is 11¼ to 12½ pounds per cubic foot. Beech wood is generally impregnated in two stages and will absorb 12½ to 22 pounds of oil per cubic foot. It is valuable for marine work, being durable but it cannot be obtained of sufficient length for piles. Its use is confined to planks for covering the projecting portions of piles and for bulwarks, steps and slipways. (*Ingeniören.*)

Drill for Square Holes

Machining comparatively long square holes generally entails a heavy expense, due to the fact that several locations of the work and many cuts are involved before the operation is completed. William R. Robbins, machine-shop superintendent of the Morse Dry Dock & Repair Co., New York, is credited with having devised a tool which will machine square holes in metal in a few hours time. Under the older method of filing and scraping, the same operation has sometimes required several days. Drills capable of cutting square holes in wood are practicable and have been in use for many years, but this instance is said to be the initial attempt to develop a successful tool

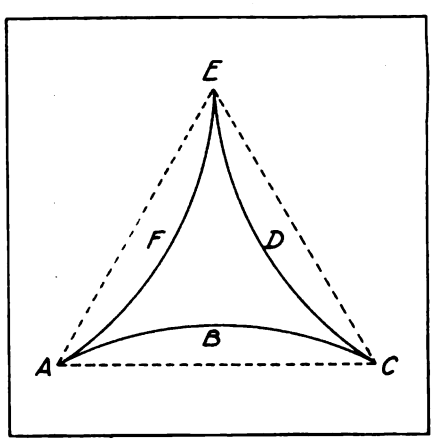

FIG. 1—SHAPE OF TOOL FOR CUTTING SQUARE HOLES

for machining an accurate square hole in metal, of dimensions which prohibit the work being done on the slotter or on a die sinking machine.

A steel casting that was to hold the bottom die of a 100-ton steam hammer for the Morse company's new forge shop was sent to the machine shop to be finished. Two holes, 3 inches square and 7 inches deep were required to hold the die in place. The usual mthod employed in cutting square holes of this character is first to drill them round and then to file and scrape them to the required dimensions. In some instances, a succession of square broaches are used. These are expensive to make, however, and unless the machine shop

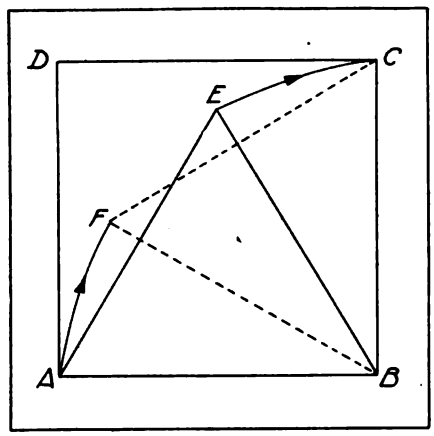

FIG. 2—HOW THE LEADER GUIDES THE TOOL

happens to have the required sized broaches on hand it would hardly be practicable to make them for one job only.

Mr. Robbins used a 3-cornered tool with a chip clearance on each face. The success of the tool lies primarily in the shape and secondly in the manner in which it is used. It does not revolve around a stationary axis as does an ordinary drill but around a traveling axis which has an elliptical course.

The tool works on the principle of a 4-throw eccentric, its motion being guided by a leader which is strapped in place above the hole to be machined. It is said that the tool makes a clean cut with sharp corners and that holes 6 to 8 inches square are easily machined through its use. It will also cut holes as small as ½ inch square.

In the tool, the sides of the triangle are equal to the side dimension of the hole to be cut. A bottom view of the tool, illustrating the cutting edges, is shown in Fig. 1. Here, *A B C* is the first cutting edge, *C D E* the second and *E F A* the third. The tool is of the end cutting variety. The function of its sides is only to generate the desired motion from the leader.

With a radial drill there is, naturally, a traverse motion of the head along the cross rail and a radial motion of the cross rail about the column. In cutting square holes with the device under consideration, the nut that engages the feed screw on the cross rail is disconnected entirely. Thus, it is evident that the tool is free to move as the leader causes it to, because the construction of the radial drill, with the nut mentioned disconnected, readily permits this.

An illustration of how the leader actually guides the tool during the cutting operation is shown in Fig. 2. *A B C D* is the square leader and *A B E* the triangular tool. At first, the side *A B* of the tool fits closely against the side *A B* of the leader. *B E* then moves to the side *B C* of the leader. The corner *E* of the tool moves to the corner *C* of the leader and the corner *A* of the tool moves to *F*. This motion is continued from the side *A B* of the leader to the side *B C* then to the side *C D*, to side *D A* and back to the side *A B*. The tool makes 1⅛ revolutions to cover the complete outline of the leader.

The radial motion of the tool is further illustrated in Fig. 3. The shank of the tool is at *A*. It revolves 90 degrees upon the circumference of a circle, the radius of which is equal to the distance from the center of the triangle to one of its corners. *A* moves to *B* on this circle, then to *C* then to *D* and back to *A*. During this time the cutting edges of the tool are machining away the stock. The fact that the tool is triangular in shape and makes 1⅛ revolutions in moving around the complete outline of the leader causes a clean chip to be cut from the piece in process of machining.

In setting up the piece for machining, a round hole a little smaller than the required dimension in the finished piece should be drilled. The object of this is to remove superfluous stock. The leader is then strapped in place in the correct location above this hole. It is obvious that the leader should be protected from

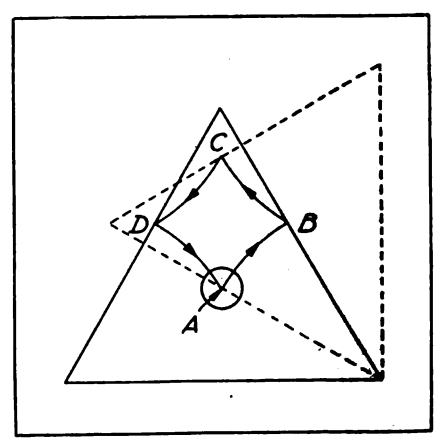

FIG. 3—DIAGRAM OF MOTION GENERATED BY THE LEADER

undue wear by hardening. In machining pieces where extreme accuracy is required the leader could be made in sections which would permit the guiding surfaces being finished by grinding. In ordinary work, however, the slight distortion caused by hardening should not materially affect the shape of the leader. This could be further eliminated by making the leader of tool steel and hardening it in cyanide and oil.

Arc Welding for Ships

W. L. Roberts, in the *General Electric Review*, shows how the anglesmith's work is facilitated by use of arc welding in producing staples, and then pre-

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dicts that the use of staples will soon be abandoned in favor of directly arc welding the parts to be joined. Other applications described are to the construction of water, oil, and air tanks, stacks, condensers, ballast tanks, etc.

It is obvious that the staples now used to make water-tight or oil-tight joints around frames or beams may be eliminated by welding the joints involved. It is found that rivets may safely be put through welds where necessary. Also, welded metal may safely be tapped. T-branches can be welded into pipe lines at a fraction of the cost of construction by other means. More than half the rivets in a ship may be eliminated if only the shell, bottom, deck, and bulkhead plates be welded on their edges.

Redesign Wood Boats

Experienced and old-time navigators do not believe that the United States shipping board will successfully carry out the announced program to change at least a portion of the wooden steamers into sailing craft. Following the announcement that many of the wooden ships would be taken from the Honolulu run and brought to the Atlantic through the Panama canal and then converted into windjammers, the experts proceed to prove by

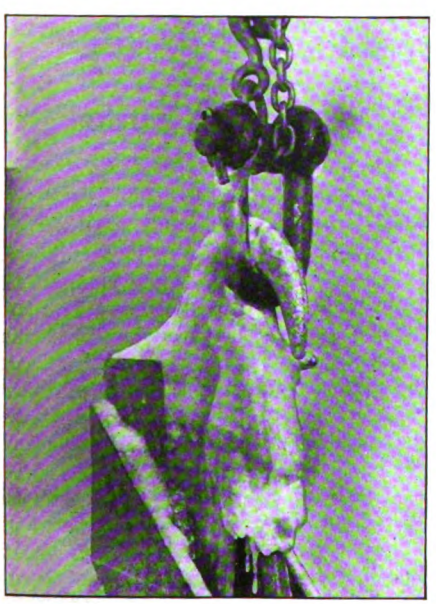

FIG. 1—CONDITION OF DEVICE AT THE BEGINNING OF THE TEST

various arguments that the vessels will not do for this purpose at all. It is contended that the ships are not constructed along the right lines to carry sail, and that if this feat is attempted the best speed under normal conditions will be about two miles an hour. To convert the wooden steamers into sailing vessels would be no small architectural task and their sale in their present shape appears to be utterly impossible, according to reports.

Experienced navigators are also averse to the proposal to convert the vessels into barges. They say that they would be unwilling to take one of them in tow upon deep water because of the danger incurred should a heavy gale be encountered. Chairman Hurley of the shipping board also realizes that the wooden ships offer a separate problem from that present in connection with the disposition of the steel ships belonging to the government.

Test Boat Release

During the severe winter months, when ships' gear of all kinds is generally covered with a thick coating of frozen spray, the problem of getting away life boats quickly when the command is given to abandon ship is often serious, due to the fact that an accumulation of ice on the

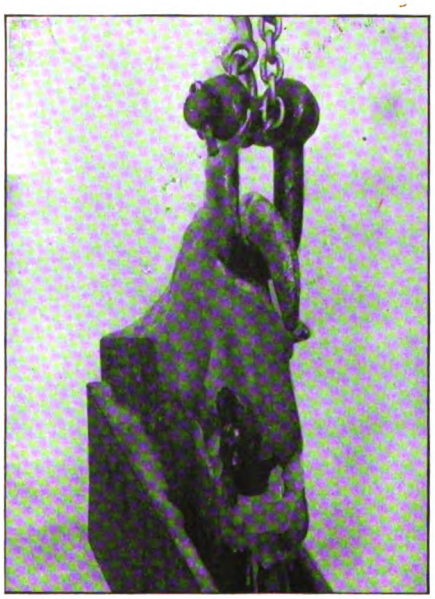

FIG. 2—ICE BROKEN BY PULLING THE HAND RELEASING LEVER

boat releasing devices may prevent their functioning properly.

The Steward Davit & Equipment Corp., New York, manufacturer of mechanical davits and lifeboat gear, recently conducted an interesting test to ascertain the reliability of its boat releasing gear when thickly coated with ice. The device in question was described in THE MARINE REVIEW of January, 1919.

In the accompanying illustrations, Fig. 1 is the gear ready for testing. The gear was packed with snow and then sprayed with water to duplicate as nearly as possible the conditions that might be encountered at sea during a cold spell of weather. Fig. 2 shows the condition of the ice after the releasing hook had been actuated by hand. The pull required to break the ice was 52 pounds. Fig. 3 shows the device after releasing. The ice was broken by a weight of 1300 pounds. In this test, the releasing device was mounted on a structure resembling the stem of a lifeboat while the releasing hook was suspended from a reliable scale. Weights were piled on the structure until the ice broke—the weight being checked by means of the scale.

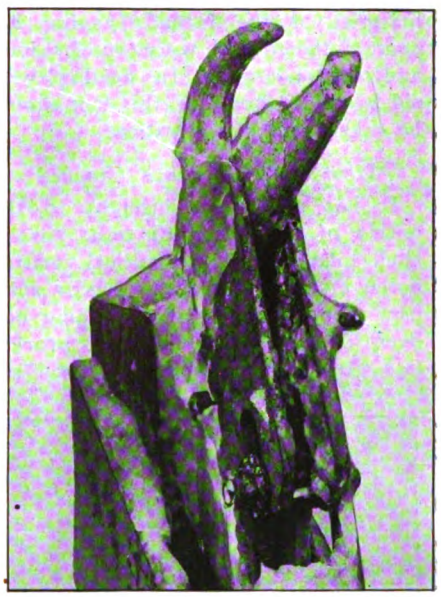

FIG. 3—THE DEVICE RELEASED BY 1300 POUNDS WEIGHT

It is pointed out that the test shows the reliability of the device to release when completely covered with ice, due to the fact that the weight required to break the ice, thus letting the device function properly, was extremely light when compared to the weight of a loaded lifeboat.

Rules for Boiler Repairs

Approval of the use of the electric or oxyacetylene processes for repairing boilers of steamships has been given by the British authorities. The British board of trade has published instructions to surveyors of vessels for official use on this subject. These state:

The repairing of the boilers of passenger steamers by the above processes has been tentatively in operation for a considerable period and, in view of the experience gained, the surveyors are informed that, provided the work is carried out to their satisfaction by experienced workmen, these processes may be employed, within limits, for repairing cracks in furnaces, combustion chambers, and end plates of boilers, and in the same parts for reinforcing the landing edges of leaky riveted seams which have

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become reduced by repeated chipping and calking.

In some old furnaces which have been repaired by the above processes it has been found that, after a few months' working, cracks have again developed at parts adjacent to those welded; probably owing to the original material of the furnace having become fatigued and worn out by long and severe usage. In dealing with old furnaces, therefore, this fact should be taken into consideration.

How a Shell Plate Cracked

It has also been brought to the notice of the board of trade that a shell plate of a cylindrical marine boiler cracked recently through a solid part where some surface welding had been done by the electrical process two years ago. The welding had extended for a length of about 12 inches along the outside calking edge of one of the middle circumferential seams at the bottom of the boiler, the leaky edge of the seam and the adjoining shell plate having been covered (soldered) by metal deposited by this process in the usual way. The shell plate was 1 5/32 inches thick and the crack, which followed the line of surface welding, extended in a circumferential direction for a distance of 2 feet 9 inches, the welded part being situated midway along the crack.

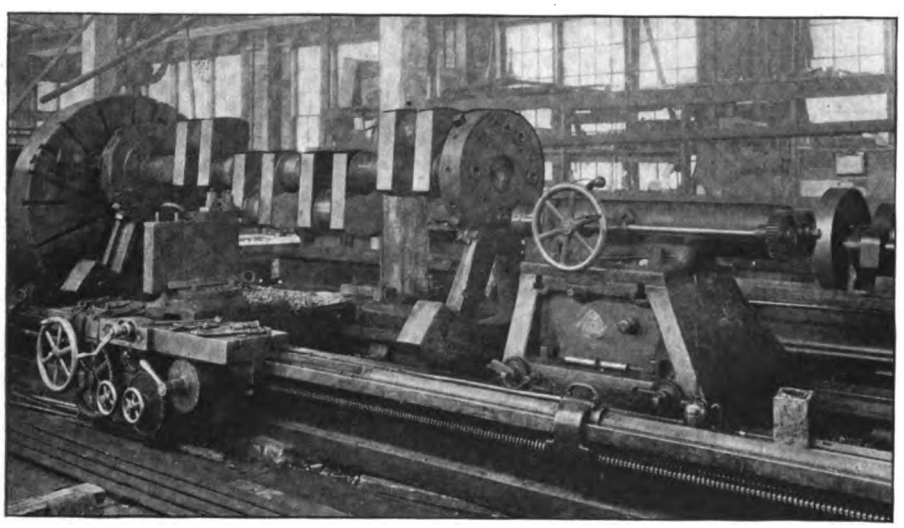
For the present it is not proposed to prohibit, within limits, the reinforcement of the circumferential seams of boiler shells if the end plates are well stayed but no welding should be done to these parts by any process which may cause local heating over an appreciable area of the plate, such as the oxyacetylene, oxyhydrogen, or other similar methods.

In no circumstance should any part of a boiler of a passenger vessel be welded if wholly in tension under working conditions, such as a stay or the shell plate at a longitudinal seam, the failure of which by cracking at the welded part, might lead to disastrous results.

In any case in which the proposed repairs to the boilers of passenger vessels by either of the above processes are of an uncommon or unusually extensive character, the particulars should be submitted for the board's consideration and approval.

After repairs by welding have been completed, the parts at or adjacent to the welds should in all cases be well hammer tested, and, unless the welding is of a trifling character, a hydraulic test of not less than one and a half times the working pressure should be applied to the boiler after the hammer testing has been effected.

This supersedes circular 1532, dated April, 1913, which is hereby canceled.



OFFSETS EQUIPPED WITH HARDENED CENTER BUSHINGS AND ADJUSTABLE COUNTERWEIGHTS FOR TURNING MULTIPLE-THROW CRANKSHAFTS

Oil from Shale Deposits

Attention is being paid to the oil-shale deposits in the United States, and the possibility of exploiting them to take the place of the present liquid oil supply. It is estimated that the latter source of supply will be exhausted in about 20 years. Oil-shale deposits are found in several parts of the United States, but those in Colorado and Utah are the most extensive and have so far received the greatest attention.

Oil shale has no oily appearance to indicate that it contains free oil, but upon being subjected to heat, its organic materials are broken up, and, among other things, oil and gas are yielded. The yield varies from 6 to 90 gallons of crude oil per ton of shale. The crude oil when distilled may give 7 to 12 per cent gasoline, 28 to 49 per cent kerosene and 39 to 62 per cent residuum. Shale analysis indicates 0.5 to 3 per cent moisture, 20 to 52 per cent volatile matter and 45 to 80 per cent ash. The asphalt varies from 0.5 to 4 per cent and paraffin from 2 to 9 per cent.

The by-products of oil shale are valuable, and include gasoline, kerosene, lubricants, enamels, varnishes, paints, rubber substitutes, manufacturing products for glass, pottery and ornamental tiles, dyestuffs, ammonium sulphate, flotation oils and producer gas. The Colorado shale area covers more than 2500 square miles and the Utah area over 3000 square miles. The strata varies from a few inches to 80 feet thick. The yield is from 31½ to 80½ gallons per ton.

In Scotland over 3,000,000 tons of oil shale are profitably treated annually, but it is only the ammonium sulphate produced as a by-product which makes the business pay. On the other hand, the prospects of the American oil-shale industry should be good, because in Scotland the shale beds are comparatively thin, irregular, steeply inclined, deep, and expensive to work, whereas in Colorado and Utah they are relatively thick, suitably located high up for gravity transportation, and give a yield of 40 to 50 gallons per ton, against 20 gallons in Scotland.

Offsets for Crankshaft Turning

Turning crankshafts from solid forgings is an operation that requires careful setting in the lathe if accurate results are desired. This is especially true with regard to the pins. The lathe shown in the accompanying illustration is used for turning crankshafts for semidiesel-type engines at the National Forge & Tool Co., Irvine, Pa., and is equipped with offsets of the company's design.

These offsets are cast iron, carefully bored to fit over the shaft couplings. They carried hardened bushings to fit the lathe centers and are banded with forged-steel rings through which the bolts that fasten them to the couplings are threaded.

As the illustration shows, several center bushings can be provided to permit the offsets being used on different types of shafts. While the shaft shown is cranked at 180 degrees, the offsets can also be used for turning shafts which are cranked at 90 degrees as the center bushings at the front and back, plainly show.

The counterbalancing devices are also efficient and novel. These are in the form of cast-iron weights which are

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bolted directly to the forged-steel ring that encircles the offsets. Tapped holes are provided for locating the counterweights in different positions. By providing counterweights to accommodate different types of shafts, the utility of the offsets is materially increased.

To Increase Oil Output

According to the United States geological survey, the petroleum output of the country in 1918 amounted to 345,000,000 barrels. The demand for domestic petroleum in that year was approximately 366,000,000 barrels. The deficiency was made up by imports from Mexico. In all the known oil fields considerable extensions were made. Extensive developments, affecting the future supply of high-grade oil, took place in the central and northern Texas field. About 60 oil wells were completed during 1918, and at the end of the year the new field was credited with a potential capacity of 50,000 barrels of oil a day, though its actual capacity, limited by pipe-line facilities, was only about 18,000 barrels a day. The campaign of drilling over more than 40 counties in northern Texas before the end of 1918 would doubtless result in the opening of other pools of high grade in 1919.

Diesel Engine Fuel

Attempts have been made, with some measure of success, to use tar in diesel engines for the sake of economy. O. Schertel, of Hamburg, Germany, may be said to have led the way in this direction. Now after three years' experience in the use of tar for that purpose, he announces further success through a process of filtering.

The tar undergoes a preliminary purification by passing it through a filter consisting of gravel of from 3 to 5 millimeters size, and then passing it again, in the opposite direction, that is from the bottom of the filter upward through finer gravel of 1 to 2 millimeters. Much time is allowed for the filtering, the speed of flow through the gravel being only about 12 centimeters an hour.

Oil Engine Developments

That responsible builders are confident the fabricated boat is an established commercial proposition was indicated in the annual report of the Submarine Boat Corp. The interests owning this corporation also own the Electric Boat Co., the Electro-Dynamic Co. and the New London Ship & Engine Co. Not only is it intended to build fabricated vessels for international account, but it is hoped to develop the diesel oil engine. The report stated:

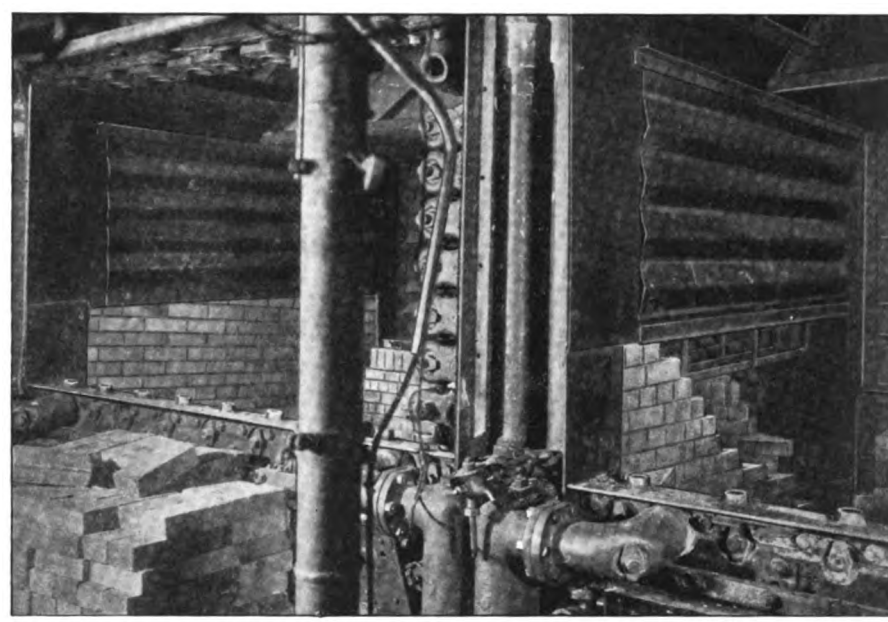
"The Submarine Boat Corp. is operating the Newark Bay shipyard under lease from the Emergency Fleet corporation, which provides that no work shall be done at that plant except for the Emergency Fleet corporation, but the development of the standardized steel cargo vessel has progressed to such an extent that the management believes it will be able to create an international business in the production of standard steel cargo vessels and the furnishing of parts for the assembling of said vessels in foreign countries, and in addition to the standard type of 5500-ton vessel, the company has developed plans for several types of vessels of larger dimensions.

"The technical forces of the company have been studying with great care the development of a proper diesel engine for cargo vessels, which is of a different type from that required for submarine torpedo boats, and it is expected that during the coming year diesel engines of large power will be produced by us which will create a large business for the manufacturing facilities of the company and may require additional plants for the manufacture of such diesel engines in quantity."

Boiler Setting Cement

How a newly adopted foundry practice was fitted to marine work was recently demonstrated by the Robins Drydock Co., Brooklyn, N. Y., when the French cruiser, MARSEILLAISE, was brought into the yard for work on her boilers. The French vessel had been anchored up the Hudson river for some time when it was decided to reset her boilers. She has four stokeholds with three boilers in each. All 12 boilers were reset.

For the first time in marine history some other material than fireclay was used. In this instance the fire brick which formed the seat for the boilers were set in a high temperature cement mixture, a product of the Quigley Furnace Specialties Co., New York. This material has been used in furnace work, but never before in marine construction or repairing. It is claimed to be well adapted for marine work not only because of the high temperatures attained in the boilers, but also because of the motion, vibration and the tremendous shocks present on a navy vessel. Under such conditions fireclay may crack and break, whereas the material in question was designed to give a firm bond with the brick and withstand extremely high temperatures. Its coefficient of expansion is equivalent to that of firebrick, and it is said to withstand the scouring effect of oil firing or a forced flame of any kind.



SETTING BOILERS IN THE FRENCH CRUISER MARSEILLAISE—THE FIREBRICK IS LAID WITH HIGH TEMPERATURE CEMENT

Late Marine Patents

Copies of any of the following patents can be obtained by sending 15 cents in stamps to Siggers & Siggers, National Union Insurance building, Washington, by mentioning THE MARINE REVIEW:

1270792.—Ship protector. Thomas A. Dalton, Hazleton, Pa.

1270903.—Launching apparatus for steam or sailing vessels. Joseph Weismantel, Irvington, N. J.

1271036.—Fin for vessels. Henry A. Jenkins, Fayetteville, N. C.

1271081.—Ship. John Reed, New York.

1271090.—Torpedo guard for ships. Robert J. Shields, Hobgood, N. C.

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Business Men Study Marine Policy

Delegates at Meetings of Foreign Trade Council and Chamber of Commerce Hear Discussions of Maritime Problems

IN recent weeks, American business has focused its attention on marine problems with a degree of appreciation and interest that would have been impossible several years ago but which is now becoming general. The discussion centered at the meeting of the National Foreign Trade council at Chicago, April 24-26, and of the Chamber of Commerce of the United States, St. Louis, April 29-May 1.

The principal addresses were made by James A. Farrell, president of the United States Steel Corp.; Homer L. Ferguson, president, Newport News Shipbuilding & Dry Dock Co., E. N. Hurley, chairman, United States shipping board, and Benjamin Rush, president, American and Foreign Insurance association. Liberal abstracts from several of these papers follow:

Mr. Farrell made a keen analysis of our merchant marine problems, drawing from the present situation, real encouragement for the future. Mr. Ferguson recommends a return to private initiative in shipbuilding. Mr. Hurley analyzes the government's attitude toward shipbuilding and ship operation, while Mr. Rush discusses marine insurance and the importance of strengthening America's position in this market.

The chamber of commerce adopted resolutions recommending completion of government ship contracts at the earliest possible date; the removal of restrictions on building ships for foreigners; the revision of shipping, navigation, classification and measurement laws; the discontinuance of government operation or ownership of vessels, ships to be operated by American private interests through sale or charter, and the establishment of coal and fuel depots on all foreign trade routes.

High Wages Will Not Prove Handicap

By James A. Farrell
President, United States Steel Corp.

IN connection with the development of American shipping from first to last the impelling force of the process has been the dictates of necessity. Anything which could properly be called policy that has guided the process has been the product of a felt want, and to that extent at least has lacked the element of deliberate choice.

What American Genius Did

In regard to the decreasing of American shipping in the fifties, it is certain that the decline of our merchant marine was due to no falling off in the skill of American mechanics. It was they who made the essential improvements in Watt's engine; who introduced the long stroke and invented the accepted type of paddle wheels, besides showing how speed could be increased by substituting for the bluff, heavy type of steamship a more graceful contour.

Regarding the present situation, the temporary appearance as a military necessity of the government of the United States as a shipbuilder and shipowner on a colossal scale does not render it any less a fact that the future of the American merchant marine must depend on the attractions which it offers to the employment of private capital and the application of private enterprise. The steamship business is one requiring special and exceptional aptitudes. The men engaged in it have to match their wits against the keenest in the world; have to be prompt in decision, resourceful, expedient and expert in the calculation of probabilities. These are qualities which are not usually forthcoming when a government assumes the functions of private enterprise. As a commercial proposition, government-owned ships in foreign trade could only result in disorganization of existing trade routes in which government ships might engage, while bringing about a complete paralysis of individual effort to obtain for private American ships a larger share of American sea-borne commerce. Thus, in the event of government ownership and operation of merchant vessels becoming a settled policy, the problem of the future of American shipping would solve itself by the extinction of private endeavor.

Asks Pertinent Questions

Any policy which places at the disposal of any single class of producers a fleet of government steamers is bound to be unsuccessful. How, for example, under the policy indicated, could it be determined in whose interest the necessity for the development of foreign trade was most pressing; what section of the country would it favor; and would it take account of the transportation of manufactures wholly finished, half finished, or of crude materials?

Mr. Hurley's plan, with perhaps a few minor exceptions, appeals to many shipping men of experience having at heart the upbuilding of an American merchant marine, as a plan dictated equally by business sense and equity and in the public interest.

Must Provide Definite Policy

If in other respects we are able to meet the competition of the world on equal terms, especially with types of ships built or to be built, comparable with those of our competitors, experienced in long voyage trades, the relatively high wages of American officers, engineers and seamen sufficient in numbers to operate economically with safety will not prove to be a serious handicap. Of course it is essential that laws requiring the employment of an excessive number of seamen or engineers, be repealed by the establishment of a definite policy.

One of the earliest requirements of the shipping situation is likely to be a general international agreement about the employment of the agencies of ocean transportation in the least

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wasteful and most effective manner.

The freedom of the seas, as a working formula of peaceful intercourse, should find a larger conception. It should stand for open ports and as free an interchange of commodities as the fiscal necessities of the nations will allow. To ourselves, with a merchant marine commensurate with the resources of our country, the lesson will come with new force, that to sell we must also buy.

Must Maintain Shipbuilding Industry

By Homer L. Ferguson,
President, Newport News Shipbuilding & Drydock Co.

WHEN we entered the war in April, 1917, there were about 100 ways available for building steel vessels, and there was about 15 months' work ahead for each way. The output of the 75,000 men engaged in the industry was about 400,000 gross tons per annum, in addition to the output of vessels for the navy.

To the United States shipping board were entrusted by the government almost unlimited power and money for the operation and building of ships. The Emergency Fleet corporation was formed to put into effect the general policies of the shipping board as regards shipbuilding. Differences of opinion arose almost at once in connection with the policies to be pursued in inaugurating the shipbuilding program. The policies which were formulated, however, are to blame for much wasted effort.

The problem of steel ship construction was the difficult one. Contracts for steel vessels were let to almost any reputable concern which was willing to start a new shipyard for patriotic or financial reasons. A large number of yards were begun, equipment ordered, and work started. It has been thoroughly demonstrated, however, that both management and skilled men are needed to construct and operate a shipyard. Time passed, money was spent, but deliveries were slow.

The construction of large shipyards for erecting vessels was undertaken, the fabrication of the steel to prepare it for erection being sublet to the bridge and structural steel works of the country located at a distance from the seaboard. Special designs of comparatively small vessels were prepared to meet the needs of this method of building. The output of the steel mills was overtaxed to meet the anticipated needs of these shipyards, but the output of ships was disappointing.

To meet the labor situation, several steps were taken:

Rates of wages were substantially increased early in 1918, to attract workers to the new shipyards and to enable the old yards to increase their working force. The new rates were made substantially uniform all over the country to prevent one shipyard from being robbed by another. The effect of this and later increases was to increase the cost of vessels so that now the labor cost per ton is over twice what it was for similar work in the same yard two years ago.

Shipbuilding Snapshots

WHILE discussing the subject of American shipbuilding Mr. Ferguson draws many interesting conclusions, a few of which follow. These are taken from his impromptu remarks delivered before the National Foreign Trade council in Chicago, April 25.

Steel equals one-seventh of the cost of ship fabrication.

In 1920, Japan will have from 1,500,000 to 2,000,000 tons of shipbuilding capacity.

The English fleet cost $1,000,000,000. The world fleet cost over $2,000,000,000. The United States fleet cost $4,000,000,000, but is worth but half of England's fleet.

Any policy of building ships at $200 a ton and planning to sell them later at $100 to $125 a ton should be abandoned.

The Newport News company gladly canceled orders for $10,000,000 worth of destroyers after the armistice was signed.

There is no urgent necessity to finish all ships on our war program and where the keels are not laid they should not be started. We have some in this class at Newport News.

Uniform wage scale is unsound. Many workers got from $7000 to $9000 per year. Colored workers often received $100 to $175 per week for 48 hours' work but the results were poor.

Cost-plus basis wrecks an organization.

The government should abandon its present shipbuilding program and then seek competitive bids.

Conditions on foreign ships were bad before the war but have improved to the extent of attracting American seamen.

Oil engines mark a big advance. Oil supplies in this country put us in a position to operate economically with this form of propulsion.

Underwriting and inspection should be controlled in this country.

The possibilities of the future of the industry are not bright, however, despite the interest which has been aroused throughout the country. A large amount of capital has been invested in building new and enlarging old shipyards, but it has been invested under abnormal conditions and is greatly in excess of the amount which would have been required in normal times. Unless it is written off, plenty of work at good prices will be necessary to keep some of the yards going, on account of the high fixed charges. Labor is demanding short hours and high wages, and it is only partially trained at that. The recent reduction in the price of steel has not brought it within range of 1913 prices, and the prices of shipbuilding materials and equipment are on a high level. Shipbuilding wages have gone up over 150 per cent and wages in the steel industry have risen approximately the same. The cost of steel vessels per ton, therefore, will be two or three times the prewar prices until the industrial conditions change.

There is a shortage of vessels for the world's trade, but to enable us to overcome the handicaps under which we labor, wise legislation and some sacrifices on the part of the business interested in foreign trade will be necessary if American built ships are to occupy the position which the future security of this country demands. One lesson which we should learn from the war is that there is not time after war is declared to build the necessary ships. A large output of ships must be maintained in peace times to keep the shipyards at a high state of efficiency—in other words, we must be prepared.

The wages of first class mechanics engaged in shipbuilding in Great Britain, as recently reported by a representative British shipbuilder, are $20 to $25 per week, whereas the wages of similar mechanics in the United States are from $34 to $40 per week. The wages of first class mechanics in Japan, as recently reported by a representative Japanese shipbuilder, are $1.25 to $1.50 per day,

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and the rivet driver in Japan with pneumatic tools averages about 250 rivets per day.

American ship owners state that it is difficult, if not imposible, for them to compete with foreign owners on account of high wages paid, and more men required. It is interesting in this connection to note that the wages of seamen constitute probably from 7 to 12 per cent of the cost of operation of a vessel, whereas in the building of a vessel in a shipyard from 40 to 50 per cent of the total cost is labor.

We will more likely compete with foreign shipbuilders in the design and building of special vessels for a given service than in building what are known as "tramps."

If we are to have a maritime nation and a real Merchant Marine of our own it is necessary that we build up strong insurance and classification agencies in this country, as they both form vital parts of the merchant marine, and also that we take advantage of our unquestioned prior rights to carry our own products to our own customers and bring back their goods to our own country in return.

It is not my purpose to discuss the disposal of ships now owned by the United States shipping board. The ships will undoubtedly be used whether they remain the property of the government or are sold to American citizens. If this first fleet of merchant ships is to be kept in being, and and the trades in which they are engaged are to be kept up, it will be necessary to build over 1,000,000 gross tons of merchant ships per annum in order to replace the inevitable depreciation through ordinary wear and tear, collisions, groundings, etc.

Faces Serious Problem

A serious factor which confronts those shipyards which for years have engaged in naval work, and which work at times furnished the greater part of their reasons for existence, is that the government has equipped during the war a large number of navy yards for building vessels and has built a few vessels. If the present policy of the government is continued it is likely that the navy department will build the greater part of its future vessels, even if they cost more than private builders would ask.

American shipbuilding at the present time is practically at the very peak of its productive capacity. Whereas in August, 1914, the seagoing merchant marine of the United States amounted to less than 2,000,000 gross tons, the total construction already added in the United States during the war has amounted at the present time to about 3,000,000 gross tons. When all vessels under construction have been completed, the gross tonnage of merchant seagoing vessels for the United States will amount to between 11,000,000 and 12,000,000 gross tons.

The productive capacity of shipyards in the United States has reached such a point that there is no possibility of that capacity being fully utilized as they can produce ships at a rate equal to more than the world's requirements before the war.

An American merchant marine cannot be permanently established and maintained without an American shipbuilding industry, and it seems probable that the American people intend to have their own merchant marine. Shipbuilding in the future will depend largely upon the kind of merchant marine policy we adopt, as ships can only be sold to those who desire to employ them in remunerative trade. If it is worth while for the United States to expend nearly $4,000,000,000 to build a merchant marine in time of war, it is worth something to build one in time of peace and it is thought by competent observers that $100,000,000 spent before the war would have later saved $1,000,000,000.

Predicts Success for U. S. Shipping

EDWARD N. HURLEY, chairman of the shipping board, holds optimistic views regarding the future of the American merchant marine as evidenced in his speech at the Chicago foreign trade convention. "Ships are the controlling factor in the development of a foreign trade," Mr. Hurley said. "Before the war only 9.7 per cent of our total exports were carried in American bottoms. It is our hope, if our program is completed, to have sufficient ships to move 50 per cent of the total commerce in American bottoms."

In speaking of the situation as he found it in Europe, Mr. Hurley said: "Here in America we find some cloistered critics asserting we will never be able to compete with British shipping. Over in England you will hear English critics telling their government that Great Britain will never be able to compete with us."

At the recent convention of the Chamber of Commerce of the United States held in St. Louis, April 30, Chairman Hurley also expressed bright hopes for the future of the American merchant fleet.

"With the closing down of the tremendous energies which built up an American merchant marine in so short a time, the talk about war prices for ships has brought up very vividly two questions with reference to America's ability to maintain her place upon the seas.

"One of these is that American shipyards cannot hope to build ships in competition with foreign yards; the other is that the high cost of operating American ships so heavily handicaps our merchant marine that after they are built they cannot compete with ships under foreign registry.

"The first question was answered the other day when the Submarine Boat Corp., Newark Bay, N. J., announced its readiness to contract for 12,000-ton steel ships at $149 per deadweight ton. There are reports from abroad of prices quoted lower than $150 a ton, but we can discover no contracts which have been placed.

"One of the pioneer shipbuilders in this country, Homer L. Ferguson, had advised us that on future orders which we may desire to place for 12,000 and 15,000-ton freight ships he will quote us a flat price lower than the $149 offer we received from the Submarine Boat Corp. and he has also agreed to cancel the cost plus, a fee contract which we have with him and give us a flat price per deadweight ton on these ships.

"The question as to whether American ships, after they are built, can be operated in competition with other nations is a vital one, and the following information may be of interest.

"Great Britain is paying her seamen $72 per month, which includes a war bonus of 20 per cent and which, I am reliably informed, the British seamen will never relinquish. We are paying our seamen $75 a month, a flat scale without war bonus, and will continue to pay that wage. The French and Dutch are also paying high wages to their merchant crews.

"Mr. Rosseter, former general manager of the Pacific Mail Steamship Co., and vice president of W. R. Grace & Co., wrote as follows in response to my request for his views on the question of ship operation:

"'At the outset I wish to state with utmost emphasis and firm conviction, that there are no insuperable obstacles to our success in competition with other nations.'"

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Activities in the Marine Field

Latest News from Ships and Shipyards

Great Lakes' Shipyards Maintain Pace

GREAT LAKES' shipyards, which made such a splendid showing last year in turning out tonnage for the Emergency Fleet corporation, have not relaxed efforts, even though urgent tonnage needs for war demands are fast giving place to peace requirements. At the present time, the production of ships all over the lake district is progressing efficiently. Out of a total of 61 ships turned over to the Emergency Fleet corporation in April, Great Lakes' yards delivered 44, equal to 72.5 per cent. On account of canal restrictions, the percentage of tonnage was lower but, notwithstanding, amounted to 40 per cent of the total tonnage turned over to the government during April. Vessels built on the Great Lakes for deep-water service range from 3500 to 4200 tons. With but one exception, every vessel delivered in April was ahead of contract date, the average being 66½ days ahead of schedule. Henry Penton, Emergency Fleet district manager for the Great Lakes' district, states that the remarkable showing made by lake yards is due to team work all along the line.

* * *

When the steamer CHEROKEE recently hit a bridge at the Welland canal, she sustained damage to the extent of $25,000. She has been towed to Buffalo for repairs.

* * *

When the steamer M. A. REEB stranded at Detour late last season she sustained damage that cost the underwriters $185,000 to repair. The REEB was repaired at Buffalo.

* * *

The steamer SONOMA, which recently went aground in the channel at the entrance of Buffalo harbor, was released after she had lightered 10,000 bushels of grain. She was not damaged to the extent of causing her to leak.

* * *

While making for Lake Erie, the steamer HOWARD, in ballast, went ashore recently, approximately a mile east of Cape Vincent, Lake Ontario.

* * *

The American Shipbuilding Co., Cleveland, will be clear of government contracts by October. This company has orders for 111 steel vessels for 1919 delivery. A. G. Smith, operating manager of the company, states that the company is ahead of schedules and that the last keels at all yards of the company will be laid by June. The company is building vessels for deep-water service at its Superior, Wis., South Chicago, Detroit, Lorain, O., Cleveland and Buffalo yards.

* * *

The shipping board has rejected bids on four Great Lakes' vessels, the ADRIAN ISELIN, LUCIUS W. ROBINSON, F. P. JONES and the A. D. MACTIER. The bids were opened recently at Washington. The shipping board will dispose of all vessels in the future through the medium of private negotiation. It is said that this can be done by authority of the President.

* * *

It will take approximately three weeks to complete repairs on the steamer SHIRAS which damaged 25 plates when she piled up on Rockefeller reef, Lake Michigan, recently. She is now in drydock at South Chicago.

* * *

The Lorain, O., yard of the American Shipbuilding Co., recently launched hull No. 761, building for the Emergency Fleet corporation. The vessel is expected to leave for salt water some time in June.

* * *

The Lehigh Valley Transportation Co., Buffalo, will operate five vessels in Lake Michigan trade this season. This is the result of an appeal made by shippers of Lake Michigan ports to Director General Hines of the United States railroad administration. Three boats for this trade have been chartered from the Great Lakes Transit Corp. They are the DELOS W. COOKE, the MILWAUKEE and the F. R. UNDERWOOD. The other steamers in the line are the MAUCH CHUNK and the WILKESBARRE.

* * *

Capt. Walter Brooks, formerly of Detroit and Buffalo, recently organized a company in New York known as the Nacirema Steamship Co. Fifteen wooden steamers have been purchased from the shipping board to form the nucleus of the company's fleet. These vessels were purchased for $650,000 each. Captain Brooks formerly was employed by Boland & Cornelius, Buffalo. The vessels will be used in the New York, New Orleans and Havana trade.

* * *

The first lumber cargo for the season to arrive in Cleveland was brought in by the C. H. BRADLEY from Lake Superior. The early lumber movement, it is said, will be light.

* * *

Due to the exceptionally mild winter, navigation opened at the Soo the earliest it has in the last 41 years. The vessel to open navigation was the steamer E. W. PARGNY of the Pittsburgh fleet which docked at Kemp's fuel dock on the evening of April 9. The PARGNY was the first vessel of the fleet of winter storage grain vessels from Georgian bay ports to break through the ice in Hay and Mud lakes. She made the run almost on regular time. For many years past, the opening of navigation has entailed a large amount of ice breaking but due to the mild winter, such difficulty was not encountered. While the demand for ore tonnage is expected to be light during the first part of the season, tonnage demands in general are favorable as shown in the Soo canal report for April published elsewhere in this issue. Lake vessels are not hampered for lack of crews this season due to the fact that there are more men out of employment who are anxious to sign on than there has been for many years previously.

* * *

The steamer F. E. HOUSE, which left Duluth recently, had to put back on account of a broken eccentric. The steamer G. G. CRAWFORD likewise sustained a similar accident which compelled her to turn back to Duluth. When the steamer KEARSARGE arrived in Duluth recently, in ballast, it was found necessary to send her to the shipyards to have a few rivets tightened.

* * *

The steamer MUNISING, which went aground at Byng inlet, late last fall, is in drydock at Duluth to repair damage to her bottom.

* * *

The steamer STEINBRENNER while shifting to elevator K, Duluth, rammed the corner of the Hanna coal dock at Superior. She damaged a plate on her starboard bow, 2 feet above the waterline. Repairs were immediately made.

* * *

The first boat to arrive at Green Bay, Wis., from a lower lake port this season was the steamer PENOBSCOT.

* * *

The first ore cargo to arrive at Lorain, O., this season was brought in by the steamer JOHN W. GATES. The vessel was towed to the National Tube dock.

* * *

At a recent meeting in Pittsburgh, it was decided not to make any change in the ore-handling charge at Lake Erie ports this season. Ore prices are fixed, based on a reduction of 20 cents in the lake freight rate. There was some talk of advancing the handling rate 5 cents a ton. This would have brought the handling rate to 15 cents a ton. Furnace men will get the benefit of the cut in the lake rate.

* * *

With all her machinery, boilers and other equipment aboard, and her superstructure complete, the steamer LAKE FUGARD was recently launched in Buffalo, at the plant of the Buffalo Drydock Co. When she struck the water

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she had steam up and was practically ready to go in commission. It is reported that she furnished a spectacular launching.

* * *

The fourth lock at the Soo will be opened in July, it is announced. S. B. Harding, who has charge of the electrical installation, recently inspected the work.

* * *

Repairs to the steamer W. GRANT MORDEN which was drydocked at Port Arthur, Ont., cost approximately $25,000. Fifteen plates were removed and 12 faired in place.

* * *

The steamer MATAAFA got beyond control and hit the pier at Two Harbors, recently. She broke one of her anchors and hawse pipe and damaged two plates. She was taken to the Superior shipyard for repairs which were immediately begun.

* * *

The wrecking equipment of the Great Lakes Towing Co.'s wrecking steamer FAVORITE, which recently was placed in commission, includes a complete oxyacetylene welding and cutting outfit. The use of this equipment for wrecking purposes is comparatively new but it will be employed in making repairs by welding and in cutting out rivets, broken plates, etc. Tanks containing acetylene gas and oxygen were furnished by the Linde Air Products Co., New York, to be filled at the various supply depots at Great Lakes' ports.

Up and Down the Pacific Coast

THAT a few shipbuilders on the north Pacific view the future of the industry with some concern is indicated by the prediction made that the yards at Portland, Oreg., will be closed by next November. This statement was made by J. R. Bowles, president of the Northwest Steel Co., Portland, Oreg., at a conference recently held at Portland upon call of Mayor George Baker, who asked the shipbuilders to get together with the idea of insuring the future of the industry. Mr. Bowles called attention to the gravity of the unemployment situation, stating that his firm will begin to discharge employes in June, continuing until October when he expects operations to cease. From 30,000 to 50,000 men, he said, will be thrown out of work in Portland alone and other coast cities will face the same conditions. Cancellation of government contracts "with autocratic rules which make it impossible for us to obtain foreign contracts," was the reason assigned by Mr. Bowles for this sudden cessation of work. The first wooden yard on Puget sound to close is the Allen plant at Seattle, which has launched three hulls for the shipping board. One of these has been fitted as a steamship and the other two are to be completed as barges.

* * *

Labor troubles are again threatening in Puget sound waterfront circles. Longshoremen at Seattle are insisting on the closed shop while employers have refused to hire the men at the union halls. Work has been delayed on several Oriental liners, one having been diverted to Tacoma, Wash., as the result. When Director General Walker D. Hines, of the railroad administration, was in Seattle recently, the union longshoremen appealed to him to reverse the order establishing the open shop on railroad piers. It was this ruling which precipitated the present controversy.

* * *

In Lake Union, a fresh water body within the city limits of Seattle, are anchored 14 wooden hulls built for the shipping board. Only two of these hulls have engines installed and they may be placed in service. The others are awaiting disposition. So large is this fleet of idle vessels becoming that it has suggested the famous expression "Bridge of ships" which will shortly bridge the little lake. Lake Union is connected with Puget sound by the Lake Washington locks, completed about two years ago. It is an ideal water basin for idle vessels. The shipping board is planning to double the number of hulls, some being towed from the Columbia river and Grays Harbor to the local storage basin.

* * *

The Belgian motor schooner GABY, completed months ago at Grays Harbor, Wash., for the Belgian government, is unable to put to sea because of a controversy with the county authorities who have assessed a county tax of $1,794.75 against the vessel. The owners contend that this is an unjust charge and they are contesting it in the courts. A counter claim against the county for $8,050 damages and $350 per day demurrage has been made. The case is of interest as the court's decision will likely establish a precedent.

* * *

It has been estimated that the steel shipyards of Puget sound expended $28,000,000 last year for steel plates and freight on ship material. These facts have been presented as an additional argument why a steel plant should be established at a north Pacific point. For several years, there have been rumors that such an industry would be centered there and it is known that various groups of capitalists have made investigation. With ore in abundance in British Columbia and ample coal supplies, it is pointed out that this is a logical location for such an industry. The future of shipbuilding would be assured, it is believed, were a steel plant established.

* * *

The wooden steamship BROOKDALE, recently completed at Grays Harbor for the shipping board is to be remodeled and used as a training ship for seamen apprentices. The BROOKDALE is now at Seattle and will soon undergo extensive changes. It is intended to make offshore cruises to Alaska and the Hawaiian islands.

* * *

The Todd Dry Docks, Inc., repair plant on Harbor island, Seattle, has been in successful operation for several months. It has been busy during the past month. The three drydocks have been in constant use. General repair work, combined with work for the shipping board has crowded the plant's capacity. Several 7500-ton steel vessels, launched by the Todd yards, Tacoma, Wash., are being completed at the Seattle yard.

* * *

The Ames Shipbuilding & Dry Dock Co., Seattle, has begun the construction of the first unit of its 18,000-ton drydock which it will locate adjacent to the company's shipbuilding plant in the West waterway. The dock will be built of wood in six pontoon sections, each unit to take more than 1,000,000 feet of lumber. It is expected to have the dock completed by the end of the present year which will give Seattle the best drydock capacity and facilities of any north Pacific port. The Todd Dry Docks, Inc., has three large docks in operation, Skinner & Eddy Corp., one large, dock, and the Heffernan Dry Dock Co. one, all of which have been taxed to capacity for many months.

* * *

According to the official report of the investigation of the wreck of the Canadian Pacific steamship PRINCESS SOPHIA, which was lost between Skagway and Juneau, Alaska, last October with an appalling loss of life, the master of the vessel was not under restraint from his owners as to his decisions with respect to sending the passengers ashore. The investigators assume that he used his best judgment in keeping passengers and crew aboard believing that the ship's position was secure and that there was no immediate danger.

* * *

Rather a novel experiment is to be attempted by Alaska with the passage by the territorial house of representatives of a bill authorizing Alaska to enter the steamship business with chartered vessels. An appropriation of $300,000 is made available for this purpose. A thorough investigation of conditions is to be made before definite action is taken by the commission in charge, of which the governor is made secretary-treasurer. For a long time Alaskans have complained of poor steamship service which the private operators state is due to poor business and low freights.

* * *

The Los Angeles Pacific Navigation Co., Los Angeles, recently organized in that city as the result of community agitation of the necessity of direct connection with the Orient, is now booking freight for its first vessel from Los Angeles to the Far East. The WEST

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CAJOOT, a Los Angeles-built vessel, is now on berth for Kobe, Shanghai, Hongkong and Manila and will get away on her initial voyage during May. According to the plans of L. D. Sale, president of the company, the firm expects soon to be operating a line of steamers to all ports of call in the Orient and will also enter the Australasian and West Coast territories, giving Los Angeles direct connection with all transpacific trade.

* * *

The Moore Shipbuilding Co., Oakland, Cal., recently launched two 9400-ton cargo steamers and one 10,000-ton tanker in one day. As soon as the ways were vacant, three more keels were laid. Early in August, the Moore company intends to launch six vessels, three of each of the above types, in one day. The company also has begun the construction of a wooden floating drydock of 10,000-ton capacity. This unit will be built in four sections with two pumps for each section. The work is in charge of Howard C. Holmes, engineer, San Francisco.

Along the Atlantic and Gulf Coasts

THE Boston tug CHARLES W. PARKER JR., employed in towing coal barges between Chesapeake bay points and Boston, is believed to have foundered off the New Jersey coast with a loss of 17 men. The PARKER was commanded by Capt. J. C. Catharin, Somerville, Mass., and was owned by the New England Fuel & Transportation Co. The barges MARYLAND and BALTIMORE, in tow, were picked up by rescue craft.

* * *

The 4-mast schooner LEWIS H. GOWARD, of Boston, has been sold through Crowell & Thurlow to the French-American line and will be placed in overseas trade.

* * *

Capt. C. R. Kelley, for 12 years a port warden at Boston, has taken command of the 6-mast schooner WYOMING which will load at New Orleans for a port in Europe.

* * *

The all-water service between Boston and New York has been resumed by the Eastern Steamship Lines, Inc., with the BELFAST, Captain Robinson, and the NORTH LAND, Captain Ingalls. The BELFAST, however, collided with the Sagamore bridge in the Cape Cod canal and will have to be repaired before resuming service.

* * *

Fire on the Leyland line steamship SCYTHIAN damaged a cargo of flour to the extent of $30,000 and the departure of the ship from Boston for Liverpool was delayed five days.

* * *

The barge OCTORARO, owned by the Reading railroad, caught fire in Boston lower harbor recently and although the blaze was soon extinguished, the cargo of coal had to be unloaded to permit the barge being taken to her home port for repairs.

* * *

The New England Barge & Tower's association, which was recently incorporated to take the place of the organization of owners under the shipping board, has elected officers as follows: President, Capt. A. L. Crowley; vice president, E. M. Richards; secretary, G. H. Sargent; treasurer, J. J. Burke.

* * *

The NORFOLK, a new tug owned by the Northern Transportation Co., recently reached Boston from Norfolk on her maiden voyage with two barges in tow.

* * *

The Boston-Baltimore service of the Merchants & Miners Transportation Co. which was suspended during the war, has been resumed with one sailing weekly.

* * *

Service between Boston and Maine ports has been resumed by the Eastern Steamship Lines, Inc., after many months of inactivity. The CAMDEN now makes three trips each week to Bangor, Me., and the GOVERNOR DINGLEY maintains a similar service to Portland, Me.

* * *

The new commonwealth pier, Boston, has been thrown open to business and the first ship to berth there is the VEENBERGEN from South Africa. The pier shed, which is 140 x 400 feet, is connected with the Boston & Albany railroad.

* * *

Review of the state tax laws of Louisiana to eliminate or change any clauses tending to restrict foreign trade through the port of New Orleans, or to discourage the location of new business there will be taken up at the next regular session of the general assembly. Taxes of Louisiana on business and on raw materials and their manufacture are higher than they are in other states, and this discourages the establishment of shipyards, ship lines or other enterprises in the state.

* * *

The Mobile Shipbuilding Co., Mobile, Ala., recently launched the sixth and last of the 3500-ton composite ships for which it has contracts. The hull was christened OYAKA. The company will devote its attention from now on to steel ships.

* * *

The Jahncke Shipbuilding Corp. recently launched the PONTCHARTRAIN, a 3500-ton Ferris-type hull at its yard at Madisonville, La. This is the fourth and last vessel of this type to be constructed by the Jahncke corporation for the shipping board. This yard will be kept open permanently, and is now starting work on a number of wooden auxiliary schooners for service on the Gulf of Mexico.

* * *

Of interest to all shipbuilding companies and repair plants which may be now located or may seek to locate in New Orleans is the recent ruling of the board of commissioners of the port that no permits will be granted for pipe lines running through the levees which hold the river in check there. The ruling came up on application of the Jahncke Dry Dock & Shipbuilding Co. for permission to run a 12-inch water pipe through the levee.

* * *

Advices received by New Orleans shipping men indicate that exports from the United States to Australia during the first eight months of 1918 exceeded American imports from that country by $8,000,000. By way of comparison, it also was reported that there was a balance of $40,000,000 in trade against Australia in favor of the United States in 1912. Heavy shipments of clothing, agricultural machinery and machine tools have been made to Australia from New Orleans in the first few months of 1919, going by way of the Panama canal.

* * *

Buena Ventura, the most important port of Colombia, is to expend $1,000,000 on wharves and terminals, according to report among steamship men in New Orleans. The harbor improvement project was financed through G. Amsinck & Co., New York.

* * *

Ferris type steamers BEAUMONT and ONEICO, built by the Beaumont Shipbuilding & Dry Dock Co., Beaumont, Tex., sailed for European ports recently. Both were fully equipped, provisioned and loaded at Beaumont.

Cramp's Yard is Busy

DURING the war, the William Cramp & Sons Ship & Engine Building Co., Philadelphia, built 17 torpedo boat destroyers, transports, passenger and cargo vessels and oil tankers for the government. Between the time of the declaration of war and the signing of the armistice, the yard laid keels for 30 vessels, 28 of which were launched. At the present time the company has enough government work on hand to keep its yard busy for two years.

The net earnings of the company for the last eight months of 1918 were $1,539,095. For the corresponding period of 1917 the net earnings were $1,507,402. After depreciation, interest and other charges were subtracted, the surplus for the 8-month period of 1918 was $1,085,326. This was a slight increase over the amount earned for the same period of 1917. It equaled $17.79 a share on the $6,098,000 outstanding common stock.

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Equipment Used Afloat and Ashore

Cargo Handling Equipment—Slotting Machine—Thread Cutting Tool—Oscillating Surface Grinder—Electric Rivet Heater

TO expedite the loading and unloading of vessels and to handle freight at pier sheds, the hoisting and handling machinery should be designed along up-to-date lines. The rapid handling of freight reduces demurrage charges and the nonproductive time during which the vessels are in dock. Also it increases the amount of business that can be handled in a given time.

The Edward F. Terry Mfg. Co., New York, manufacturer of cargo handling equipment, has developed electric cargo handling apparatus for many purposes among which is the pier-shed equipment shown in the accompanying illustration. The pier illustrated is equipped with overhead traveling cranes which, during the unloading of vessels, take care of distributing and storing miscellaneous freight.

Many kinds of freight, as taken from the holds of the vessels, can be stacked with the cargo crane. In this connection, the company points out that the roof trusses should be at least 30 feet from the floor. The roof of the shed is equipped with hatches and, in loading vessels, cargo can be stacked to advantage near the hatches where it is readily handled by the cargo crane.

The cargo crane shown is of the straight-line type and is designed for rapid operation. It travels lengthwise of the pier on the shed roof and is equipped with a balanced hoist and transporter. It has an extension boom to facilitate serving the cargo hatches of the vessel. Under ordinary conditions, the crane has a capacity of 3 to 5 tons.

The hoisting mechanism is designed for balancing the deadweight of the hook block and ball. These can be skipped together with half the average live load during hoisting and lowering operations. It is pointed out that this feature reduces the size and weight of the hoist and motor required. One drum, which is fixed to its shaft without friction clutches, is used for hoisting the load and moving the carriage. This feature is said to permit a substantial reduction in the weight of the hoisting mechanism.

The control for hoisting and conveying operations is simple in design and construction. The operator uses a controller brake, shift lever and foot lever. The latter operates a band brake on the hoist drum. In starting to hoist, the current is supplied through the controller. The change of direction from hoisting to traveling is accomplished by throwing the shift lever which operates without shock. To stop the traverse movement, the current is thrown off and the brake applied. To lower the load, the shaft lever is thrown back and the motor reversed.

An improved method of housing the boom is employed. This member is extended and withdrawn in a straight line without swinging motion. The end of the boom is automatically supported through the medium of stay lines. The hoisting and traversing mechanism is in operating condition at all extension points of the boom.

In many locations, it is advantageous to have the freight shed set back a short distance from the face of the dock which leaves a space between the slip and the shed which can be used for a driveway or for the installation of railroad tracks. It is pointed out that the traveling cranes in the shed is designed to reduce handling costs, as they cover the entire floor area and are capable of piling freight to a height of 25 feet, thus utilizing the available floor space to the best ad-

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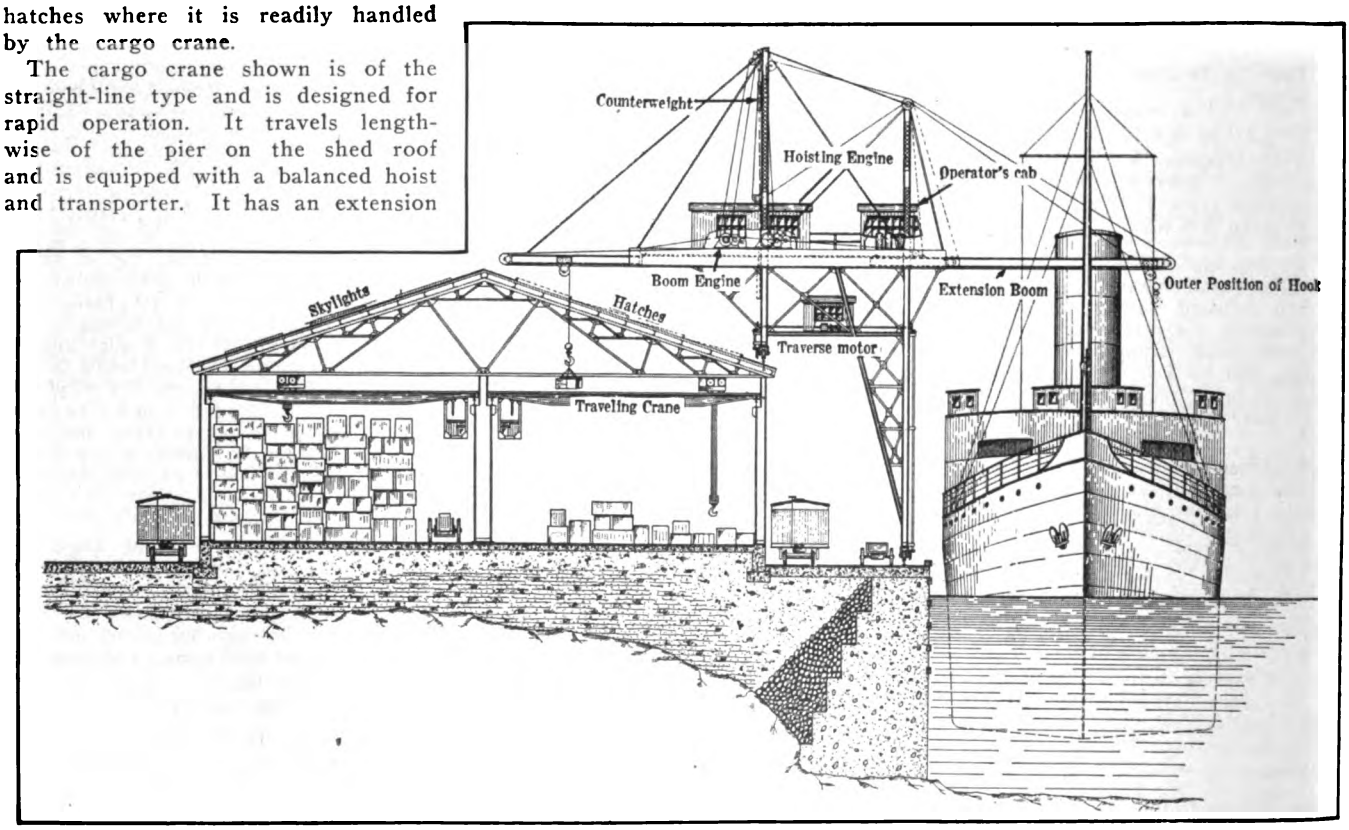
Efforts have been resumed to raise the tug Bisso, sunk in 150 feet of water near Pointe a la Hache, on the river,



PIER-SHED EQUIPMENT COMPRISING A HOISTING AND CONVEYING CRANE AND TWO OVERHEAD TRAVELING CRANES FOR DISTRIBUTING FREIGHT

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below New Orleans, by a Chicago wrecking company. Bisso was sunk in collision with a freighter some months ago, and the contract price for raising her has been fixed at $100,000. She belongs to the W. A. Bisso Towing & Coal Co.

Crank Slotting Machine

In the general run of marine work, both on new equipment and repairs, many pieces of irregular contour or with enclosed rectangular surfaces require finishing. Many parts also require keyseating. Work of this nature is admirably done on the slotting machine as the downward cutting action does not obliterate scribed lines because the start of the tool's down stroke does not throw up a burr.

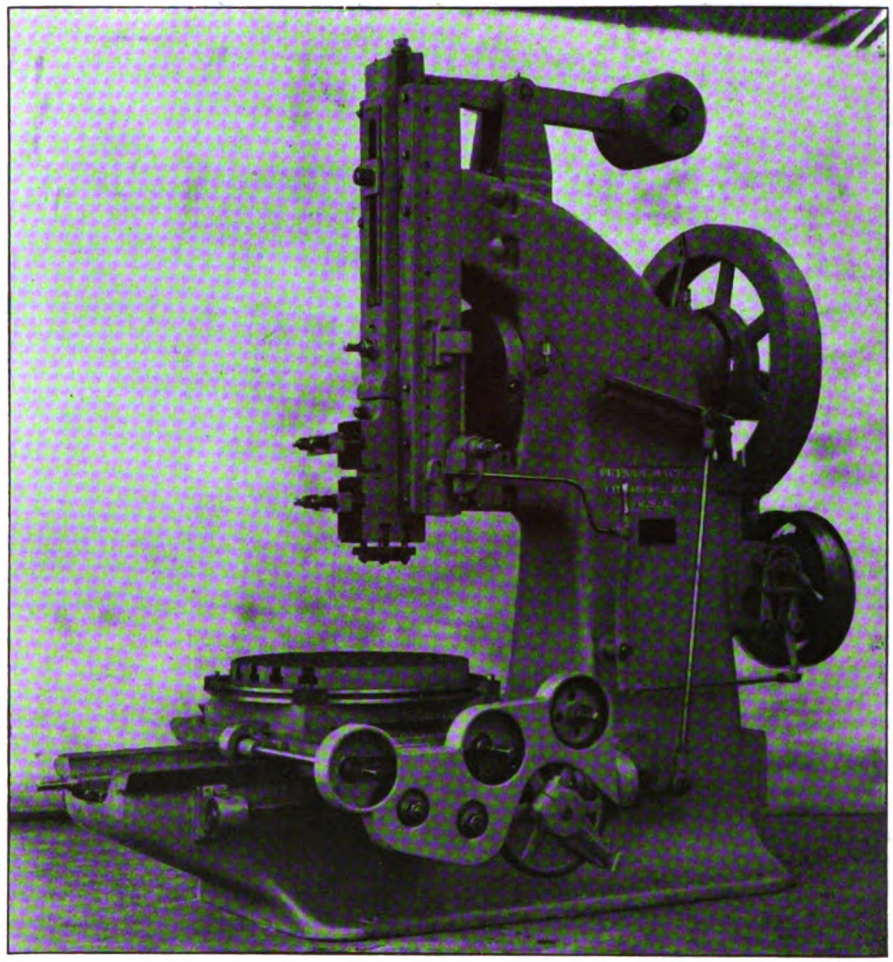
A slotting machine particularly adapted for marine work is shown in the accompanying illustration. This machine has an 18-inch stroke and is a product of the Putnam Machine Co., Fitchburg, Mass. The base and column are cast in one piece to insure rigidity while the cutter bar has ample bearing surfaces to eliminate chattering while taking heavy cuts.

The cutter bar is counterbalanced through the medium of a weight carried on a forged-steel arm. The guide carrying the cutter bar is adjustable so that it can be conveniently placed near the work in process of machining. The relief apron at the end of the cutter bar is provided with both horizontal and vertical tool clamping surfaces which permits the machine to handle a wide range of work. The clamping surfaces are protected against wear by hardening and are serrated to insure a positive tool grip. The hinge is placed well back and low down to insure positive and quick relief of the tool on the return stroke. A spring tension at the top of the relief apron is controlled by a bolt. This feature permits of ready adjustment or allows the apron to be clamped rigidly to the cutter bar in cases where this is advantageous.

The quick-return device is said to be simple and efficient. It consists of a link connecting the main driving gear to a crank keyed to the shaft that actuates the cutter bar. The holes in the link are equipped with bronze bushings in which steel pins work. The parts are so proportioned that the cutter-bar speed is practically uniform throughout the cutting stroke with a return ratio of 2 to 1. All shafts are finished by grinding and all wearing surfaces are accurately scraped to a bearing.

The cutter bar has eight speeds which are provided by a 4-speed gear box and 2-speed countershaft. The feeds are actuated by a cam on the crank-disk shaft. All feeds are engaged when the cutter bar is at the top of its stroke. The rocker arm supporting the feed pawl is equipped with a slip friction so that if an obstruction is met with, the friction slips. This prevents serious breakage in cases where the operator is negligent about throwing out the feed when planing to a shoulder.

The circular platen is graduated at its periphery to insure close settings and is equipped with T-slots for accommodating strap bolts. It can be securely clamped in any position desired by four corner clamps. The compound table, on which the circular platen rides, is supported for its full width on the carriage.



SLOTTER WITH 18-INCH STROKE PARTICULARLY ADAPTED FOR MARINE WORK

Thread Cutting Tool

In the manufacture of engines and other marine equipment, it is common practice to cut many threads on the engine lathe as this tool affords a ready means for that purpose. All lathe-cut threads are not accurate, however, which is generally due to the fact that the workman is sometimes indifferent about grinding the tool to the correct angle or setting it properly. Again, a single-point tool quickly becomes dull.

To provide a thread cutting device that would overcome these difficulties, the Rivett Lathe & Grinder Co., Boston, developed the device shown in the accompanying illustration. This tool carries a cutting unit having 10 teeth, which is rotated, one tooth at a time, through the medium of a convenient lever. The first tooth cuts a light chip the full width of the thread, the second one takes a slightly deeper cut and so on until the tenth tool has passed over the work which finishes the thread. Through this method, the rapid dulling of the point of the tool is avoided.

The principal parts of the device are the sub-base, base, eccentric cutter arbor, operating lever, clamping plate, micrometer stop and cutter. The sub-base is mounted directly on the tool block of the lathe and is secured in place by a hollow-head cap screw and a nut in the T-slot.

The arbor that carries the cutter is made of tool steel, hardened, ground and lapped to a good fit. It is made conical in shape to permit of ready adjustment in case of wear. The

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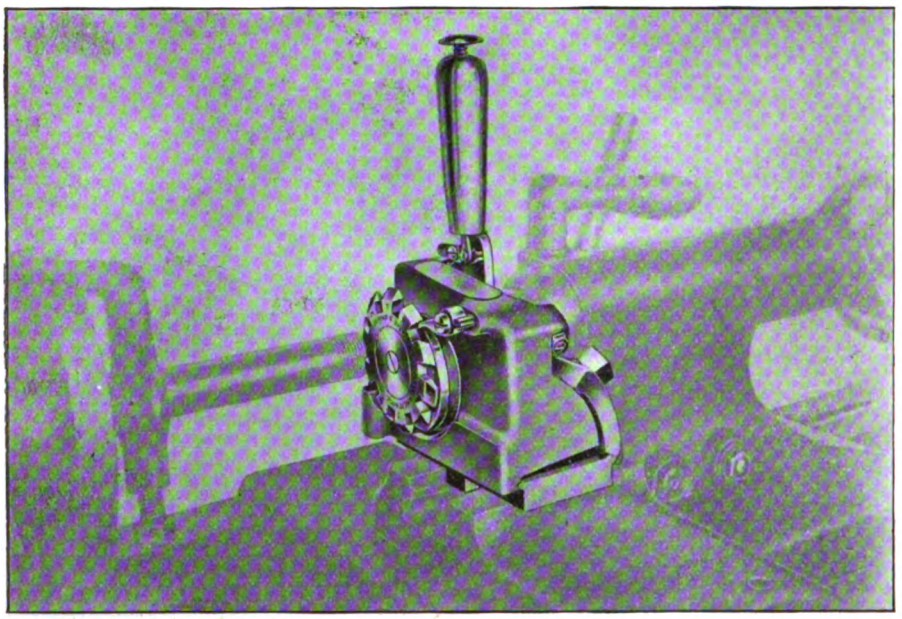


DEVICE FOR CUTTING ACCURATE THREADS ON THE ENGINE LATHE

arbor runs in a steel bushing that is fitted to the base.

The base is fitted with a micrometer stop which engages a locking pawl on the operating lever. It is graduated to read by ½ thousandths of an inch on a dial that gives 5/32 of an inch between the graduations. The front of the base is fitted with a square-head set screw which supports the operating tooth of the cutter and permits of adjustment as the cutter is worn away through sharpening.

The operating lever is fitted directly to the cutter arbor through the medium of a square hole and is held in place by a lock nut. This lever is equipped with a locking pawl which is controlled by means of a compression spring, push rod and thumb pad.

The clamping plate has a groove milled in it to coincide with the rib in the sub-base, the upper portion of which bears against the side of the base. It is held in place by means of a substantial bolt. This method of mounting, it is said, permits of angular adjustment and rigid construction.

The cutters are made of high-speed or carbon steel, at the option of the user. They are furnished for any pitch and style of thread such as V, United States standard, Whitworth, British association, Acme and International standard.

Surface Grinder

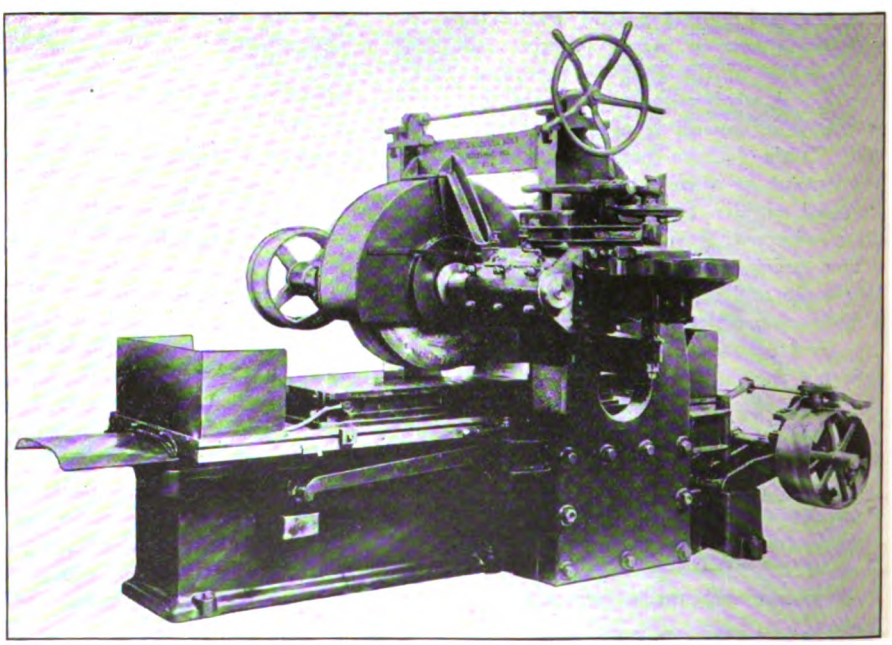
Present-day practice has resulted in many flat surfaces, heretofore machined by planing or milling, being finished advantageously by grinding. This is due to the rapid development made in abrasive engineering and grinding machine construction during the past decade which has given good results. The machine shown in the accompanying illustration is an oscillating surface grinder, designed for heavy duty by the Springfield Mfg. Co., Bridgeport, Conn. To insure rapid and adequate location of the work, it is equipped with a magnetic chuck. The machine is designed to accommodate grinding wheels 30 inches in diameter in any width up to 10 inches.

The bed is of the box type on which the platen travels. The housings that carry the wheel-spindle bearings are bolted directly to the base, somewhat after the design followed in an ordinary iron planer. The platen is driven by means of bevel gears and a screw reversing device. The wheel and wheel spindle are carried in heavy and substantial slides. These are fitted to the saddles on the face of the uprights. As the work passes under the wheel, the wheel oscillates from side to side. This movement is accomplished through the medium of the crank and connection shown at the right hand side of the tool. The lever shown just above the oscillating connecting rod operates a clutch that engages with the bevel gear which actuates the oscillating arrangement.

The oscillating motion is particularly valuable when taking heavy roughing cuts, due to the fact that as the wheel moves sidewise while the work passes under it, a shearing motion is imparted which tends to keep the wheel sharp and free cutting. In taking finishing cuts, the oscillating motion is generally dispensed with. During the grinding operation, the work is kept cool by a liberal stream of water which flows over the wheel. To prevent the water splashing as it is thrown from the wheel, sheet-metal guards are provided.

The machine will grind work 60 inches long and 26 inches wide. For grinding nonferrous metals, such as brass and aluminum, the magnetic chuck is removed and the work strapped directly to the platen as in ordinary planer practice.

While grinding steel and iron, however, better results are obtained through the use of the magnetic chuck as this device holds the work securely without distorting it.



HEAVY-DUTY OSCILLATING SURFACE GRINDER EQUIPPED WITH A MAGNETIC CHUCK FOR HOLDING THE WORK

Electric Rivet Heater

An electric rivet heater for use in shipyards and shops has been developed by the American Car & Foundry Co., Berwick, Pa. Power

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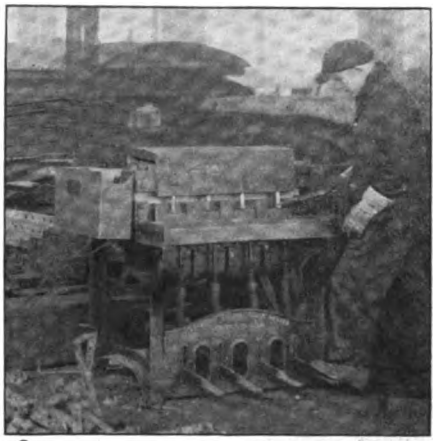
for operation is furnished by 25 or 60-cycle, 220-volt, single-phase, alternating current. The accompanying illustration shows a rivet heater in operation. Its capacity is four rivets, each rivet having an independent set of electrodes so that a hot rivet, when removed, may be replaced at once by a cold one. When all four elements of the machine are used, the four rivets have graduated degrees of heat. Power is consumed only when rivets are being heated. To operate the machine, the power switch at the left is thrown in, the foot is placed on the foot treadle to increase the distance between the electrodes, a rivet is inserted with a pair of tongs and the foot pressure is released. The heating starts as soon as the electrodes grip the rivet. It is said that the electrical method of heating prevents the rivets from becoming scaled or burned. The power required is about 20 kilowatt-hours per 100 pounds of rivets regardless of their size.



ELECTRIC RIVET HEATER IN OPERATION

A Danish concern recently completed a reinforced concrete motorship with the following, principal dimensions: Overall length, 112 feet; beam, 25½ feet; tonnage, 325. The craft is bark rigged and is powered with an 80-horsepower oil engine.

Business News for the Marine Trade

The capital of the Southern Shipyard Corp., Newport News, Va., recently was increased.

Reports are current to the effect the Ames Shipbuilding & Dry Dock Co., Seattle, is planning to build a 12,000-ton drydock.

The Collingwood Shipbuilding Co., Collingwood, Ont., is reported to be planning to have its plant electrically equipped.

Work has been started on erecting a power house, one story, 46 x 68 feet, for the Carl Hartman Dry Dock Co., Green Bay, Wis.

Plans have been filed for the erection of a 1-story plant addition by the Todd Shipyards Corp., 15 Whitehall street, New York.

A contract has been let for the erection of a 1-story, 63 n 100-foot machine shop at the plant of the Simpson Drydock Co., East Boston, Mass.

The Nova Scotia Shipbuilding Co., New Glasgow, N. S., is building a machine shop in connection with its plant at an estimated cost of $70,000.

Yarrows, Ltd., Victoria, B. C., is making extensions to its plant and will install considerable machinery and equipment.

A recent Pennsylvania incorporation is that of the Pennsylvania Welding Co., which has been capitalized at $10,000 by C. R. Rhinkett, Forty-sixth and Walnut streets, Philadelphia, and others.

W. S. Dietrich, Kutztown, Pa., is one of the incorporators of the Reading Valve & Fittings Co., Reading, Pa., which was recently incorporated with $100,000 capital.

Gerry L. Brooks, R. F. Smith and H. P. Sweetser are the incorporators of the Safety Lantern & Heater Co., Portland, Me., which was recently incorporated with $25,000 capital.

Temporary quarters have been leased at Centerburg, O., by the Faultless Anchor & Mfg. Co., pending the erection of a plant, the site for which was recently purchased.

The Baltimore Marine Iron Works, Clement and Woodall streets, Baltimore, has been incorporated with $50,000 capital, by Howard C. Crove, Harry A. Stambaugh, Alfred Burns and others.

A recent New Jersey incorporation is that of the Fraser Plate Straightener Co., 55 Prospect street, Lodi, N. J., which will engage in the manufacture of tools, etc.

The Universal Shipbuilding Co., Sturgeon Bay, Wis., is contemplating building an addition to its boiler house. H. L. Peterson, 102 Maple avenue, is secretary.

C. B. and B. E. Cox have purchased the Moznett Welding & Machine Works, 224 East Channel street, Stockton, Cal., and will increase both the welding and machine shop equipment.

The Miramichi Construction Co., New Castle, N. B., has taken over the assets of the International Shipbuilding Co., consisting of a shipyard, plant, machinery, etc. H. A. Frank is manager.

A. J. Wolcott & Co., New York, marine repairing and contracting, has been incorporated with $10,000 capital, by J. Groenewald, L. R. Swift and A. J. Wolcott, 439 Eightieth street, Brooklyn, N. Y.

A factory for the manufacture of marine electrical equipment is to be located at Seattle by the Horne Mfg. Co., Brooklyn, N. Y., according to a report. The company has opened offices at 222 Grand Trunk Pacific building. A. A. Harris is in charge.

New Offices

The Fischer & Hayes Rope & Steel Co., Chicago, has moved into more commodious quarters. It has obtained the entire building located at 741-745 West Van Buren street. Business expansion made the change necessary. The company formerly was located at 602 West Lake street.

Branch offices have been opened at 585 Mission street, San Francisco, and 515 Hoge building, Seattle, by Charles Cory & Sons, Inc., 290 Hudson street, New York, manufacturers of marine electrical equipment, etc.

Additional sales offices have been opened by the Badenhausen Co., 1425 Chestnut street, Philadelphia, manufacturer of water-tube boilers, marine and stationary engines, at 311 Jenkins building, Pittsburgh, and 1225 Marquette building, Chicago. The Pittsburgh office is under the management of A. D. Neeld Jr. and J. F. O. Stratton is in charge at Chicago.

The General Navigation Co., which was recently incorporated at Dover, Del., with $400,000 capital, by T. L. Croteau, H. B. Drew and M. M. Clancy, of Wilmington, Del., will engage in the development and operation of ships of all kinds.

A recent Delaware incorporation is that of the Washington Southern Navigation Co. The company, which is capitalized at $300,000, was incorporated by T. L. Croteau, H. B. Drew and M. M. Clancy of Wilmington, Del.

Two of four building berths have been completed by the Halifax Shipyards, Ltd., Halifax, N. S., as well as a power plant and a machine shop, 100 x 280 feet. Contractors are rushing to completion work on a plate shop, 75 x 600 feet, with a lean-to, 30 x 300 feet, and a combined office and air compressor building. Machinery is being installed in the structures which have been completed. J. E.

A contract has been awarded the Northwest Bridge & Iron Co., Seattle, by the port of Seattle commission, to furnish and put in place a 10,000-gallon steel tank. Bids will probably be requested soon by the commission for the furnishing of a gantry crane.

Yarrows, Ltd., is to move its entire plant from the Clyde to British Columbia. For many years this firm has maintained a building and repair steel plant at Esquimalt, B. C., near Victoria. The present Clyde plant will be re-established at either Vancouver or Victoria, B. C.

Contracts aggregating $2,800,000 have been awarded to the Arthur McMullen Co. for the construction of two piers for the city of Philadelphia. One pier at the foot of Fortieth street will cost $1,380,000 and the other at the foot of Wolf street will cost about $1,420,000.

A recent fire at the plant of the Virginia Shipbuilding Corp., Alexandria, Va., damaged the copper shop and tin and pipe shops. Equipment and materials for the reconstruction of these buildings have been purchased and rebuilding is to be started immediately.

About $50,000 will be spent at once by the Lake Union Drydock & Machine Works, Seattle, which recently acquired property in Lake Union shore lands. Among the improvements will be the erection of a 1000-foot dock. Oil stations and machine shops will also be erected.

It has been announced by Charles J. Spratt, president of the Harbor & Marine Co., Victoria, B. C., that a contract has been awarded for erecting a plate shop on the site of the company's new shipyard at Hospital point. Plans for the furnace shop, frame bending shop, sawmill, joiner shop and general offices now are ready.
McLurg is general manager of the company.

The business of the A. Wilhelm Co., Reading, Pa., has been taken over by the Glidden Co., Cleveland, manufacturer of paints and varnishes. The plant will be considerably enlarged by the new owners to care for increased business along the Atlantic coast.

A marine railway capable of handling ships up to 600-ton capacity will be constructed on the Young's Bay property of the Astoria Marine Iron Works, Astoria, Oreg., according to a recent announcement by Thomas Bliven, manager of the company. The company recently acquired 500 acres and also plans to erect a large steel and iron working plant.

The Marine Repair & Construction Co., Albina avenue, Portland, Oreg., has awarded a contract to the Portland Bridge & Building Co. for the necessary

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pile driving to increase the capacity of its plant from one to six ways. The new ways will be capable of handling vessels up to 200 feet in length. The yard will be equipped with the latest type of machinery and repair accessories. H. D. Sandstone is president of the company.

The Chicago branch of the General Asbestos & Rubber Co. has moved into new quarters at 14 North Franklin street, Chicago. On account of the rapid growth of its business in asbestos products, its old quarters at 106 West Lake street became inadequate. The Chicago branch was established about two years ago to take care of the western and northwestern business of the company, the home offices of which are in Charleston, S. C.

After operating the Winslow Marine Railway & Shipbuilding Co.'s plant at Eagle Harbor, Wash., for nine months, D. W. Hartzell, Inc., has relinquished its lease and the yard has reverted to its owners, James Griffiths & Sons. The lessee did considerable work at the plant in repairing and outfitting vessels for the government. Griffiths & Sons will continue to operate the plant for general ship repairs, drydocking and construction.

New Trade Publications

SHIP TELEGRAPHS.—A 32-page catalog has recently been issued by the Chadburn (Ship) Telegraph Co. of America, Inc., Troy, N. Y., which describes several types of engine-room telegraphs, revolution counters, alarm gongs, bridge transmitters, engine room indicators, etc. The catalog is well illustrated and describes each appliance in detail. Several line drawings are included which show typical installations.

SCRAPING APPLIANCE.—The Rotary Scraper Co., Inc., New York, has issued a booklet describing an appliance for removing rust and paint from iron and steel surfaces such as ships' bottoms. The device consists of a portable base on which is mounted an electric motor. This drives the scraping tools which are carried on the end of a flexible shaft. Several illustrations are included and the appliance is fully described.

LIGHTING FIXTURES.—A booklet devoted to industrial lighting fixtures has been issued by J. Livingstone & Co., Inc., New York. The subject of correct illumination is explained and it is pointed out that a correctly designed system of illumination will greatly aid in promoting production. Several types of reflectors are described and numerous illustrations are included which show lighting fixtures for various purposes.

ELECTRIC WELDING. — An interesting booklet covering the repair of the German ships has recently been issued by the Wilson Welder & Metals Co., Inc., New York. It describes how electric welding was resorted to in the emergency to get the damaged interned German vessels into commission as soon as possible. It is pointed out that a year of time and $20,000,000 was saved. Numerous illustrations are included which show some of the vessels repaired as well as many of the welding details. The company's welding apparatus is also illustrated and described.

INDUSTRIAL TRACTORS. — The Hood Mfg. Co., Seattle, has issued a catalog describing its industrial tractor which was designed for use in ship and lumber yards. The tractor is driven by an internal combustion engine which develops 40 horsepower. The tractor is described in detail and several illustrations are included. The specific work for which this tractor was designed is to transport lumber from the sorting table or timbers from the cutoff saw to the yards or loading docks. It is pointed out that the short wheel base of the device permits it to turn sharp corners and operate successfully in confined situations.

CRANES.—Traveling cranes are described and illustrated in a catalog recently issued by the Milwaukee Electric Crane & Mfg. Co., Milwaukee. The catalog is well illustrated and shows several shop and yard installations as well as details of construction. All bridge end trucks, it is explained, are structural steel fitted with cast steel brackets so designed that the load is evenly divided and distortion thereby avoided. All gears are steel, and are enclosed in oil-tight cases. An interesting feature of this crane is a hoisting limit switch which is designed to prevent over-hoisting. When the hook reaches its highest safe position the hoist motor line is automatically opened.

PROPELLERS.—A catalog describing propellers has been issued recently by the Columbian Bronze Corp., New York. It describes and illustrates propellers for various types of vessels among them being motorships, towboats and cargo boats. Built-up propellers are also described. The catalog contains much valuable information concerning the design and application of propellers for various purposes. Several tables are included which are arranged to show the speed in miles per hour of vessels with propellers of ordinary pitches at common engine speeds. The tables also include the percentages of slip and the theoretical speed of the propeller.

ENGINE ROOM TELEGRAPH. — The International Internal-combustion Engine Co., Seattle, has issued a folder describing its engine room telegraph. The system consists of two bronze instruments and dials of practically the same form as standard types. For transmission between the helmsman's station on the bridge or in the wheel house a single cable is used for each direction with a counterweight or spring at opposite ends of the system from the operating levers. It is pointed out that the weight maintains a limited and constant strain on the cable which is taken in or paid out to the opposite instrument by the operating lever on the transmitter. The folder describes the instrument in detail.

RUBBER HOSE.—A booklet containing much information concerning rubber hose has been issued by the Electric Hose & Rubber Co., Wilmington, Del. Technical information regarding the gathering, grading and preparation of rubber is given. It is stated that there are over 30 grades of rubber, known broadly as paras, which come from the Amazon river valley; plantations, which are cultivated rubbers from the East Indies; centrals, coming from Central American countries and East Indians which are wild rubbers from the East Indies as distinguished from the cultivated variety called plantations. Many illustrations are included which show how rubber hose is prepared for the user. The booklet is instructive.

BOILERS.—A catalog describing boilers has been issued by the Heine Safety Boiler Co., Phoenixville, Pa. The catalog is well illustrated with reproductions of drawings showing typical boiler settings, and illustrations showing different installations. Among the subjects treated are: Furnace design requirements, heat transmission, practical baffling in water-tube boilers, leakage and cost of repairs and renewals, hand firing with both hard and soft coal, chain grate stokers, overloads and details of construction. The catalog contains much valuable information for the practical man as well as the plant owner. A supplement is included which shows one of the company's boilers set over an underfeed stoker.

STEERING GEAR.—The American Engineering Co., Philadelphia, is issuing a 28-page illustrated catalog describing steering gears and transmission systems. Various types are fully described. The catalog contains much interesting information of practical value to the shipbuilder and naval architect. Among the devices described is a steam tiller which consists of a horizontal engine mounted directly on the tiller which is actuated through the medium of a rack that is bolted to the deck. Another interesting unit is an electrohydraulic steerer which has fluid connection to the rudder stock. A diagram is included which shows how this unit is installed. A list of data is given which is recommended to accompany inquiries for steering engines. This includes factors needed in adapting proper steering units for given purposes.

LOCOMOTIVE CRANES.—The Brown Hoisting Machinery Co., Cleveland, has just issued a catalog devoted to locomotive cranes. The catalog contains 96 pages and the subject is covered thoroughly. The booklet is profusely illustrated and shows many operations taken under actual working conditions. Details of construction are fully explained. It is pointed out that a crane's capacities are figured with the crane working on a straight and level track and that such conditions are rarely found in actual service. In most cases the hooker-on and operator make a guess at the weight of the load and radius which often causes accidents unless the crane has large overload capacities. Tables of capacities and drawings showing clearances are also included.

INDUSTRIAL CARS.—The Biehl Iron Works, Inc., Reading, Pa., has prepared a complete catalog of its industrial cars and equipment. The types shown include dump, charging and platform cars for use on standard or special gage tracks, general purpose flat top trucks, cupola trucks and fire wagons. A few special cars are shown which are made up according to specifications. A car unloader which has been developed by the company is shown. This may be fastened to the side of a standard gondola or to a box car door, and filled by shoveling. The material then may be dumped directly into a wagon below. The company also manufactures various styles of buckets for handling bulk material. These are illustrated and described. Small furnaces, ladles and miscellaneous equipment occupy the last few pages of the catalog.

OXY-ACETYLENE WELDING.—A short course in the practice of oxy-acetylene welding has been prepared by Alfred A. Kinsey, professor of shop practice at the Stevens Institute of Technology. This has been arranged in the form of suggestions for a number of lectures, combined with notes on the operation of the apparatus. These notes and suggestions are published in a most attractive form by the Air Reduction Sales Co., New York. It is recognized that the course will not make practical welders in 12 lectures and the corresponding laboratory periods. The idea, rather, is similar to that which is the basis of all college shop practice—to furnish the students a first-hand acquaintance with an important branch of engineering experience. Complete apparatus is specified for the shop work in connection with the course. A color plate teaches the student to judge the correct flame for cutting and welding. The variation in flame color due to an oversupply of oxygen or acetylene is made plain. Drawings of welding, cutting, and combination welding and cutting torches make plain the details of the tools, and the mixer and pressure regulator device is visualized by a phantom photograph.

POWDERED FUEL SYSTEM.—The Quigley Furnace Specialties Co., New York, has prepared a complete bulletin on its system of transporting, storing and firing powdered fuel. This takes up in detail the types of furnaces to which this fuel is adapted, and explains and illustrates the details of operation. The fundamental idea upon which this system is designed regards powdered fuel as a fluid, capable of flowing freely, and subject to control by valves. The preparation of fuel progresses regularly through several stages controlled by regulating devices which function automatically. From the crusher it is elevated to a magnetic separator where tramp iron is removed. It then passes to a crushed fuel bin, thence to a dryer, and by bucket elevator to the fried fuel bin. From this it is fed automatically to a pulverizer. A discharge pipe carries it then to a collector and through this to a pulverized fuel bin. From this point it is transported through pipes under air pressure to the mixer at the furnace. The system provides that the air pressure is behind the fuel and forces it as water is forced by air pressure in a tank. A wide variety of installations are illustrated and described, and details of parts, dimensions, control features, and comparative costs of operation are presented.

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